LINKSYS®
A Division of Cisco Systems, Inc.

USER GUIDE

BUSINESS SERIES

Business Series Smart Gigabit Ethernet Switch

Model: SLM2048 (EU), SLM2024 (EU), SLM248G (EU), SLM248P (EU), SLM224G (EU), SLM224P (EU)

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About This Guide

Icon Descriptions

While reading through the User Guide you may encounter various icons designed to call attention to a specific item. Below is a description of these icons:

NOTE: This check mark indicates that there is a note of interest and is something that you should pay special attention to while using the product.

WARNING: This exclamation point indicates that there is a caution or warning and it is something that could damage your property or product.

WEB: This globe icon indicates a noteworthy website address or e-mail address.

Online Resources

Website addresses in this document are listed without **http://** in front of the address because most current web browsers do not require it. If you use an older web browser, you may have to add **http://** in front of the web address.

Resource	Website
Linksys Europe	www.linksys.eu
Linksys International	www.linksys.com/international
Linksys	www.linksys.com
Glossary	www.linksys.com/glossary
Network Security	www.linksys.com/security

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Chapter 1: Introduction

Thank you for choosing the Linksys Business Series Smart Gigabit Ethernet Switch.

The new Linksys Business Series Smart Gigabit Ethernet Switches are cost-effective switching solutions ideal for small businesses, the network edge, or workgroups within larger organizations. These easy-to-install, high-speed switches offer many of the same Quality of Service and Security features found in more expensive full Layer 2 managed switches but without their complexity. The Smart Switches offer the following interfaces:

- The SLM2024 and SLM2048 offer twenty four (24) or forty eight (48) 10/100/1000 Gigabit copper ports, with two (2) shared copper or optical (SFP) uplink interfaces for connecting the switch to the core network.
- The SLM224G, SLM224P, SLM248G, and SLM248P offer twenty four (24) or forty eight (48) 10/100 copper ports, with two (2) shared Gigabit copper or optical (SFP) uplink interfaces for connecting the switch to the core network.

The Smart Switch's simplified user interface is an intuitive management tool enabling you to quickly utilize the comprehensive feature-set of the switch, resulting in a better optimized network.

For Wireless or VoIP deployments, the SLM224P and SLM248P support the IEEE802.3af standard for Power over Ethernet (PoE). This eliminates the need for additional power cables and the need for a nearby power outlet, thereby making installation simple and inexpensive, allowing networking devices like cameras and Wireless Access Points to be positioned in optimal locations like in ceilings and walls -- even outdoors.

The Smart Switch includes numerous QoS features to ensure that traffic is prioritized properly to deliver the best possible user experience for real time applications like voice and video or bandwidth intensive graphic/video file uploads or downloads. With its IGMP Snooping feature, the Smart Switch limits IP multicast traffic (real time presentations, videoconferences, on-line gaming) to only the ports that have requested it enabling the rest of the network to operate at peak efficiency. Additional QoS capabilities like IEEE 802.1p Priority Tagging, DSCP (Differentiated Services Code Point), and 4 hardware queues also maintain quality for real-time applications like voice and video. Network traffic can be optimized with the switch's 802.1Q VLAN (Virtual LAN) support which enables you to quickly segregate network traffic by department or workgroup. VLANs also provide an additional layer of security by keeping sensitive data separated from other workgroups on the network..

Network Security is an absolute requirement for any business and preventing unauthorized access to the company network is business-critical. The Smart Switch secures the network through 802.1X port authentication which prompts end-users to provide their username and password before they are permitted to pass data. User access can also be controlled through the Smart Switch's MAC-Based Filtering capability which allows network access only to those devices or workstations that have been authorized as identified by their MAC (Media Access Control) address. The Many-to-One or One-to-One Port Mirroring feature of the Smart Switch enables you to monitor the type of traffic being transmitted on the network.

The Smart Switch includes features for quickly expanding and growing your network. To substantially increase network throughput speeds, especially useful for companies whose employees are routinely backing up their hard drives to a company server or storage platform, the Smart Switch supports Link Aggregation which allows multiple high-bandwidth trunks between switches to be set up. Link Aggregation also provides a level of availability and redundancy as traffic will continue to flow even if one of the network links breaks. The Smart Switch's Spanning Tree Protocol support (STP) and Storm Control features help to control planned or inadvertent cable loops when switches are connected to one another. These loops can cause broadcast or multicast storms in the network and severely limit its performance. With these features, you can confidently build a mesh of switches and quickly expand your network to support your growing workforce.

Chapter 2: Product Overview

SLM2048

Front Panel

The Switch's LEDs and ports are located on the front panel.

Front Panel of the SLM2048

SYSTEM (Green) Lights up to indicate that the Switch is powered on. Blinks while the Switch is performing a system self-test.

LNK/ACT (1-48) (Green) Lights up to indicate a functional 10/100/1000 Mbps network link through the corresponding port (1 through 48) with an attached device. Blinks to indicate that the Switch is actively sending or receiving data over that port.

Gigabit (1-48) (Amber) Lights up to indicate a functional 1000 Mbps connection on the corresponding port (1 through 48) with an attached device.

Reset Press and hold the Reset Button for less than ten seconds to reboot the Switch. Press and hold the Reset Button for more than ten seconds to reset the Switch's settings to the factory defaults.

Ethernet 1-48 The Switch is equipped with 48 auto-sensing, Ethernet network ports, which use RJ-45 connectors. The Fast Ethernet ports support network speeds of 10 Mbps, 100 Mbps, or 1000 Mbps. They can operate in half- and full-duplex modes. Auto-sensing technology enables each port to automatically detect the speed of the device connected to it (10 Mbps, 100 Mbps, or 1000 Mbps), and adjust its speed and duplex accordingly.

miniGBIC (1-2) The miniGBIC (gigabit interface converter) port is a connection point for a miniGBIC expansion module, so the Switch can be uplinked via fiber to another switch. The MiniGBIC port provides a link to a high-speed network segment or individual workstation at speeds of up to 1000 Mbps.

To establish a Gigabit Ethernet connection using a miniGBIC port, you will need to install a MGBT1, MGBSX1, or MGBLH1 Gigabit expansion module and use Category 5e cabling or fiber optic cabling.

To establish a Fast Ethernet connection using a miniGBIC port, you will need to install a MFEFX1 (100BASE-FX) or MFELX1 (100BASE-LX) 100SFP Transceiver and use fiber optic cabling.

NOTE: On the SLM2048, MiniGBIC ports are shared with standard ports. If a miniGBIC port is used, then the shared standard port on the Switch cannot be used. The following table defines the shared port mapping of the SLM2048 Switch.

SLM2048 Shared Port Mapping

miniGBIC Port	Standard Port
miniGBIC 1	Port 24
miniGBIC 2	Port 48

Back Panel

The power port is located on the back panel of the Switch.

Back Panel of the SLM2048

POWER The Power port is where you connect the AC power.

SLM2024

Front Panel

The Switch's LEDs and ports are located on the front panel.

Front Panel of the SLM2024

SYSTEM (Green) Lights up to indicate that the Switch is powered on. Blinks while the Switch is performing a system self-test.

LNK/ACT (1-24) (Green) Lights up to indicate a functional 10/100/1000 Mbps network link through the corresponding port (1 through 24) with an attached device. Blinks to indicate that the Switch is actively sending or receiving data over that port.

Gigabit (1-24) (Amber) Lights up to indicate a functional 1000 Mbps connection on the corresponding port (1 through 24) with an attached device.

Reset Press and hold the Reset Button for less than ten seconds to reboot the Switch. Press and hold the Reset Button for more than ten seconds to reset the Switch's settings to the factory defaults.

Ethernet 1-24 The Switch is equipped with 24 auto-sensing, Ethernet network ports, which use RJ-45 connectors. The Fast Ethernet ports support network speeds of 10 Mbps, 100 Mbps, or 1000 Mbps. They can operate in half- and full-duplex modes. Auto-sensing technology enables each port to automatically detect the speed of the device connected to it (10 Mbps, 100 Mbps, or 1000 Mbps), and adjust its speed and duplex accordingly.

miniGBIC (1-2) The miniGBIC (gigabit interface converter) port is a connection point for a miniGBIC expansion module, so the Switch can be uplinked via fiber to another switch. The MiniGBIC port provides a link to a high-speed network segment or individual workstation at speeds of up to 1000 Mbps.

To establish a Gigabit Ethernet connection using a miniGBIC port, you will need to install a MGBT1, MGBSX1, or MGBLH1 Gigabit expansion module and use Category 5e cabling or fiber optic cabling.

To establish a Fast Ethernet connection using a miniGBIC port, you will need to install a MFEFX1 (100BASE-FX) or MFELX1 (100BASE-LX) 100SFP Transceiver and use fiber optic cabling.

NOTE: On the SLM2024, MiniGBIC ports are shared with standard ports. If a miniGBIC port is used, then the shared standard port on the Switch cannot be used. The following table defines the shared port mapping of the SLM2024 Switch.

SLM2024 Shared Port Mapping

miniGBIC Port	Standard Port
miniGBIC 1	Port 12
miniGBIC 2	Port 24

Back Panel

The power port is located on the back panel of the Switch.

Back Panel of the SLM2024

POWER The Power port is where you connect the AC power.

SLM248G

Front Panel

The Switch's LEDs and ports are located on the front panel.

Front Panel of the SLM248G

SYSTEM (Green) Lights up to indicate that the Switch is powered on. Blinks while the Switch is performing a system self-test.

LNK/ACT (1-48) (Green) Lights up to indicate a functional 10/100 Mbps network link through the corresponding port (1 through 48) with an attached device. Blinks to indicate that the Switch is actively sending or receiving data over that port.

100M (1-48) (Amber) Lights up to indicate a functional 100 Mbps connection on the corresponding port (1 through 48) with an attached device.

LNK/ACT (G1-G2) (Green) Lights up to indicate a functional 10/100/1000 Mbps network link through the corresponding port (G1 through G2) with an attached device. Blinks to indicate that the Switch is actively sending or receiving data over that port.

Gigabit (G1-G2) (Amber) Lights up to indicate a functional 1000 Mbps connection on the corresponding port (G1 through G2) with an attached device.

Reset Press and hold the Reset Button for less than ten seconds to reboot the Switch. Press and hold the Reset Button for more than ten seconds to reset the Switch's settings to the factory defaults.

Ethernet 1-48 The Switch is equipped with 48 auto-sensing, Ethernet network ports, which use RJ-45 connectors. The Fast Ethernet ports support network speeds of 10 Mbps or 100 Mbps. They can operate in half- and full-duplex modes. Auto-sensing technology enables each port to automatically detect the speed of the device connected to it (10 Mbps or 100 Mbps), and adjust its speed and duplex accordingly.

G1-G2 The Switch is equipped with 2 auto-sensing Gigabit Ethernet network ports, which use RJ-45 connectors. The Gigabit Ethernet ports support network speeds of 10 Mbps, 100 Mbps, or 1000 Mbps. They can operate in half- and full-duplex modes. Auto-sensing technology enables each port to automatically detect the speed of the device connected to it (10 Mbps, 100 Mbps, or 1000 Mbps), and adjust its speed and duplex accordingly.

miniGBIC (1-2) The miniGBIC (gigabit interface converter) port is a connection point for a miniGBIC expansion module, so the Switch can be uplinked via fiber to another switch. The MiniGBIC port provides a link to a high-speed network segment or individual workstation at speeds of up to 1000 Mbps.

To establish a Gigabit Ethernet connection using a miniGBIC port, you will need to install a MGBT1, MGBSX1, or MGBLH1 Gigabit expansion module and use Category 5e cabling or fiber optic cabling.

To establish a Fast Ethernet connection using a miniGBIC port, you will need to install a MFEFX1 (100BASE-FX) or MFELX1 (100BASE-LX) 100SFP Transceiver and use fiber optic cabling.

NOTE: On the SLM248G, MiniGBIC ports are shared with Gigabit Ethernet ports. If a miniGBIC port is used, then the shared Gigabit Ethernet port on the Switch cannot be used. The following table defines the shared port mapping of the SLM248G Switch.

SLM248G Shared Port Mapping

miniGBIC Port	Gigabit Port
miniGBIC 1	Port G1
miniGBIC 2	Port G2

Back Panel

The power port is located on the back panel of the Switch.

Back Panel of the SLM248G

POWER The Power port is where you connect the AC power.

SLM248P

Front Panel

The Switch's LEDs and ports are located on the front panel.

Front Panel of the SLM248P

SYSTEM (Green) Lights up to indicate that the Switch is powered on. Blinks while the Switch is performing a system self-test.

LNK/ACT (1-48) (Green) Lights up to indicate a functional 10/100 Mbps network link through the corresponding port (1 through 48) with an attached device. Blinks to indicate that the Switch is actively sending or receiving data over that port.

PoE (1-12, 25-36) (Amber) Blinks to indicate that power is being supplied to an attached powered device on the corresponding port (1 through 12, 25 through 36).

100M (13-24, 37-48) (Amber) Lights up to indicate a functional 100 Mbps connection on the corresponding port (13 through 24, 37 through 48) with an attached device.

LNK/ACT (G1-G2) (Green) Lights up to indicate a functional 10/100/1000 Mbps network link through the corresponding port (G1 through G2) with an attached device. Blinks to indicate that the Switch is actively sending or receiving data over that port.

Gigabit (G1-G2) (Amber) Lights up to indicate a functional 1000 Mbps connection on the corresponding port (G1 through G2) with an attached device.

Reset Press and hold the Reset Button for less than ten seconds to reboot the Switch. Press and hold the Reset Button for more than ten seconds to reset the Switch's settings to the factory defaults.

Ethernet 1-48 The Switch is equipped with 48 auto-sensing, Ethernet network ports, which use RJ-45 connectors. The Fast Ethernet ports support network speeds of 10 Mbps or 100 Mbps. They can operate in half- and full-duplex modes. Auto-sensing technology enables each port to automatically detect the speed of the device connected to it (10 Mbps or 100 Mbps), and adjust its speed and duplex accordingly.

G1-G2 The Switch is equipped with 2 auto-sensing Gigabit Ethernet network ports, which use RJ-45 connectors. The Gigabit Ethernet ports support network speeds of 10 Mbps, 100 Mbps, or 1000 Mbps. They can operate in half- and full-duplex modes. Auto-sensing technology enables each port to automatically detect the speed of the device connected to it (10 Mbps, 100 Mbps, or 1000 Mbps), and adjust its speed and duplex accordingly.

miniGBIC (1-2) The miniGBIC (gigabit interface converter) port is a connection point for a miniGBIC expansion module, so the Switch can be uplinked via fiber to another switch. The MiniGBIC port provides a link to a high-speed network segment or individual workstation at speeds of up to 1000 Mbps.

To establish a Gigabit Ethernet connection using a miniGBIC port, you will need to install a MGBT1, MGBSX1, or MGBLH1 Gigabit expansion module and use Category 5e cabling or fiber optic cabling.

To establish a Fast Ethernet connection using a miniGBIC port, you will need to install a MFEFX1 (100BASE-FX) or MFELX1 (100BASE-LX) 100SFP Transceiver and use fiber optic cabling.

NOTE: On the SLM248P, MiniGBIC ports are shared with Gigabit Ethernet ports. If a miniGBIC port is used, then the shared Gigabit Ethernet port on the Switch cannot be used. The following table defines the shared port mapping of the SLM248P Switch.

SLM248P Shared Port Mapping

miniGBIC Port	Gigabit Port
miniGBIC 1	Port G1
miniGBIC 2	Port G2

Back Panel

The power port is located on the back panel of the Switch.

Back Panel of the SLM248P

POWER The Power port is where you connect the AC power.

SLM224G

Front Panel

The Switch's LEDs and ports are located on the front panel.

Front Panel of the SLM224G

SYSTEM (Green) Lights up to indicate that the Switch is powered on. Blinks while the Switch is performing a system self-test.

LNK/ACT (1-24) (Green) Lights up to indicate a functional 10/100 Mbps network link through the corresponding port (1 through 24) with an attached device. Blinks to indicate that the Switch is actively sending or receiving data over that port.

100M (1-24) (Amber) Lights up to indicate a functional 100 Mbps connection on the corresponding port (1 through 24) with an attached device.

LNK/ACT (G1-G2) (Green) Lights up to indicate a functional 10/100/1000 Mbps network link through the corresponding port (G1 through G2) with an attached device. Blinks to indicate that the Switch is actively sending or receiving data over that port.

Gigabit (G1-G2) (Amber) Lights up to indicate a functional 1000 Mbps connection on the corresponding port (G1 through G2) with an attached device.

Reset Press and hold the Reset Button for less than ten seconds to reboot the Switch. Press and hold the Reset Button for more than ten seconds to reset the Switch's settings to the factory defaults.

Ethernet 1-24 The Switch is equipped with 24 auto-sensing, Ethernet network ports, which use RJ-45 connectors. The Fast Ethernet ports support network speeds of 10 Mbps or 100 Mbps. They can operate in half- and full-duplex modes. Auto-sensing technology enables each port to automatically detect the speed of the device connected to it (10 Mbps or 100 Mbps), and adjust its speed and duplex accordingly.

G1-G2 The Switch is equipped with 2 auto-sensing Gigabit Ethernet network ports, which use RJ-45 connectors. The Gigabit Ethernet ports support network speeds of 10 Mbps, 100 Mbps, or 1000 Mbps. They can operate in half- and full-duplex modes. Auto-sensing technology enables each port to automatically detect the speed of the device connected to it (10 Mbps, 100 Mbps, or 1000 Mbps), and adjust its speed and duplex accordingly.

miniGBIC (1-2) The miniGBIC (gigabit interface converter) port is a connection point for a miniGBIC expansion module, so the Switch can be uplinked via fiber to another switch. The MiniGBIC port provides a link to a high-speed network segment or individual workstation at speeds of up to 1000 Mbps.

To establish a Gigabit Ethernet connection using a miniGBIC port, you will need to install a MGBT1, MGBSX1, or MGBLH1 Gigabit expansion module and use Category 5e cabling or fiber optic cabling.

To establish a Fast Ethernet connection using a miniGBIC port, you will need to install a MFEFX1 (100BASE-FX) or MFELX1 (100BASE-LX) 100SFP Transceiver and use fiber optic cabling.

NOTE: On the SLM224G, MiniGBIC ports are shared with Gigabit Ethernet ports. If a miniGBIC port is used, then the shared Gigabit Ethernet port on the Switch cannot be used. The following table defines the shared port mapping of the SLM224G Switch.

SLM224G Shared Port Mapping

miniGBIC Port	Gigabit Port
miniGBIC 1	Port G1
miniGBIC 2	Port G2

Back Panel

The power port is located on the back panel of the Switch.

Back Panel of the SLM224G

POWER The Power port is where you connect the AC power.

SLM224P

Front Panel

The Switch's LEDs and ports are located on the front panel.

Front Panel of the SLM224P

SYSTEM (Green) Lights up to indicate that the Switch is powered on. Blinks while the Switch is performing a system self-test.

LNK/ACT (1-24) (Green) Lights up to indicate a functional 10/100 Mbps network link through the corresponding port (1 through 24) with an attached device. Blinks to indicate that the Switch is actively sending or receiving data over that port.

PoE (1-6, 13-18) (Amber) Blinks to indicate that power is being supplied to an attached powered device (PD) on the corresponding port (1 through 6, 13 through 18).

100M (7-12, 19-24) (Amber) Lights up to indicate a functional 100 Mbps connection on the corresponding port (7 through 12, 19 through 24) with an attached device.

LNK/ACT (G1-G2) (Green) Lights up to indicate a functional 10/100/1000 Mbps network link through the corresponding port (G1 through G2) with an attached device. Blinks to indicate that the Switch is actively sending or receiving data over that port.

Gigabit (G1-G2) (Amber) Lights up to indicate a functional 1000 Mbps connection on the corresponding port (G1 through G2) with an attached device.

Reset To reboot the Switch, press and hold the Reset Button for approximately five seconds. To reset the Switch settings to the factory defaults, press and hold the Reset Button for approximately ten seconds.

Ethernet 1-24 The Switch is equipped with 24 auto-sensing, Ethernet network ports, which use RJ-45 connectors. The Fast Ethernet ports support network speeds of 10 Mbps or 100 Mbps. They can operate in half- and full-duplex modes. Auto-sensing technology enables each port to automatically detect the speed of the device connected to it (10 Mbps or 100 Mbps), and adjust its speed and duplex accordingly.

G1-G2 The Switch is equipped with 2 auto-sensing Gigabit Ethernet network ports, which use RJ-45 connectors. The Gigabit Ethernet ports support network speeds of 10 Mbps, 100 Mbps, or 1000 Mbps. They can operate in half- and full-duplex modes. Auto-sensing technology enables each port to automatically detect the speed of the device connected to it (10 Mbps, 100 Mbps, or 1000 Mbps), and adjust its speed and duplex accordingly.

miniGBIC (1-2) The miniGBIC (gigabit interface converter) port is a connection point for a miniGBIC expansion module, so the Switch can be uplinked via fiber to another switch. The MiniGBIC port provides a link to a high-speed network segment or individual workstation at speeds of up to 1000 Mbps.

To establish a Gigabit Ethernet connection using a miniGBIC port, you will need to install a MGBT1, MGBSX1, or MGBLH1 Gigabit expansion module and use Category 5e cabling or fiber optic cabling.

To establish a Fast Ethernet connection using a miniGBIC port, you will need to install a MFEFX1 (100BASE-FX) or MFELX1 (100BASE-LX) 100SFP Transceiver and use fiber optic cabling.

NOTE: On the SLM224P, MiniGBIC ports are shared with Gigabit Ethernet ports. If a miniGBIC port is used, then the shared Gigabit Ethernet port on the Switch cannot be used. The following table defines the shared port mapping of the SLM224P Switch.

SLM224P Shared Port Mapping

miniGBIC Port	Gigabit Port
miniGBIC 1	Port G1
miniGBIC 2	Port G2

Back Panel

The power port is located on the back panel of the Switch.

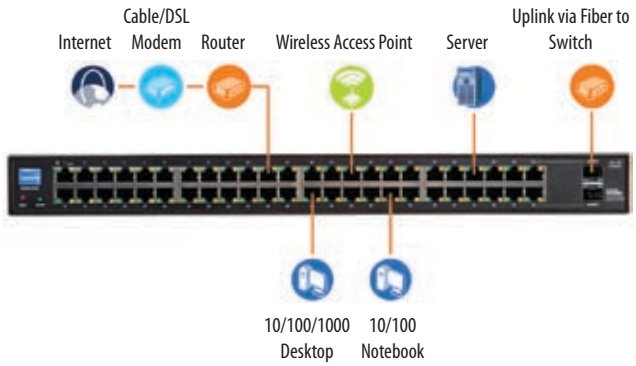
Back Panel of the SLM224P

POWER The Power port is where you connect the AC power.

Chapter 3: Installation

Overview

This chapter will explain how to connect network devices to the Switch. The following diagram shows a typical network configuration.



Typical Network Configuration for the SLM2048

When you connect your network devices, make sure you do not exceed the maximum cabling distances, which are listed in the following table:

Maximum Cabling Distances

From	To	Maximum Distance
Switch	Switch or Hub	100 meters
Hub†	Hub	5 meters
Switch or Hub†	Computer	100 meters

†A hub refers to any type of 100 Mbps hub. A 10 Mbps hub connected to another 10 Mbps hub can span up to 100 meters.

Pre-Installation Considerations

Fast Ethernet Considerations

If you are using the Switch for Fast Ethernet (100 Mbps) applications, you must observe the following guidelines:

Full-Duplex Considerations

The Switch provides full-duplex support for its RJ-45 ports. Full-duplex operation allows data to be sent and received simultaneously, doubling a port's potential data throughput. If you will be using the Switch in full-duplex mode, the maximum cable length using Category 5 cable is 100 meters.

1000BASE-T Cable Requirements

All Category 5 UTP cables that are used for 100BASE-TX connections should also work for 1000BASE-T, providing that all four wire pairs are connected. However, it is recommended that for all critical connections, or any new cable installations, Category 5e (enhanced Category 5) or Category 6 cable should be used. The Category 5e specification includes test parameters that are only recommendations for Category 5. Therefore, the first step in preparing existing Category 5 cabling for running 1000BASE-T is a simple test of the cable installation to be sure that it complies with the IEEE 802.3ab standards.

Positioning the Switch

Before you choose a location for the Switch, observe the following guidelines:

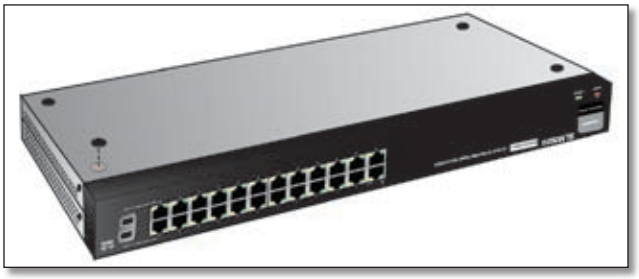
- Make sure that the Switch is accessible and that the cables can be connected easily.
- Keep cabling away from sources of electrical noise, power lines, and fluorescent lighting fixtures.
- Position the Switch away from water and moisture sources.
- To ensure adequate air flow around the Switch, be sure to provide a minimum clearance of two inches (50 mm).
- Do not stack free-standing Switches more than four units high.

Placement Options

There are two ways to physically install the Switch, either set the Switch on its four rubber feet for desktop placement or mount the switch in a standard-sized, 482,6-mm wide, 1U-high rack for rack-mount placement.

Desktop Placement

- Attach the rubber feet to the recessed areas on the bottom of the Switch.
- Place the Switch on a desktop near an AC power source.
- Keep enough ventilation space for the switch and check the environmental restrictions mentioned in the *Specifications* Appendix as you are placing the Switch.
- Connect the Switch to network devices according to the Hardware Installation instructions below.



Attaching the Switch's Rubber Feet

Rack-Mount Placement

When rack-mounting the Switch, please observe the following guidelines

- **Elevated Operating Ambient** If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.
- **Reduced Air Flow** Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
- **Mechanical Loading** Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
- **Circuit Overloading** Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- **Reliable Earthing** Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

To rack-mount the Switch in any standard 482,6-mm wide, 1U high rack, follow the instructions described below.

1. Place the Switch on a hard flat surface with the front panel facing you.
2. Attach a rack–mount bracket to one side of the Switch with the supplied screws and secure the bracket tightly.

Attaching the Brackets

3. Follow the same steps to attach the other bracket to the opposite side.
4. After the brackets are attached to the Switch, use suitable screws to securely attach the brackets to any standard 482,6-mm rack.

Mounting in Rack

5. Connect the Switch to network devices according to the Hardware Installation instructions below.

Hardware Installation

To connect network devices to the Switch, follow these instructions:

1. Make sure all the devices you will connect to the Switch are powered off.
2. For a 10/100 Mbps device:
   - All models: Connect a Category 5 Ethernet network cable to one of the numbered ports on the Switch.

For a 1000 Mbps device:

- SLM2048 and SLM2024: Connect a Category 5e Ethernet network cable to one of the numbered ports on the Switch.
- SLM248G, SLM248P, SLM224G, SLM224P: Connect a Category 5e Ethernet network cable to port G1 or port G2 on the Switch.

For a 10/100 Mbps PoE device:

- SLM248P: Connect a Category 5 Ethernet cable to one of ports 1-12 or ports 25-36 on the Switch.
- SLM224P: Connect a Category 5 Ethernet cable to one of ports 1-6 or ports 13-18 on the Switch.

3. Connect the other end of the network cable to a PC or other network device.
4. Repeat steps 2 and 3 to connect additional devices.

   SLM248P and SLM224P: If a 802.3af-compliant PoE device is connected to one of the Switch's PoE ports, the Switch automatically supplies the required power.
5. If you are using a miniGBIC port, then connect a miniGBIC module to a miniGBIC port. For more detailed instructions, refer to "Uplinking the Switch".
6. Connect the supplied power cord to the Switch's power port, and plug the other end into an electrical outlet. When connecting power, always use a surge protector.

IMPORTANT: Make sure you use the power cord that is supplied with the Switch. Use of a different power cord could damage the Switch.

7. Power on the devices connected to the Switch. Each active port's corresponding LED will light up on the Switch.

Uplinking the Switch

To uplink the Switch using a 1000 Mbps Ethernet port, connect one end of a Cat 5e (or better) Ethernet network cable to one of the Gigabit ports, and then connect the other end of the cable into the peripheral device's uplink port. MDI/MDIX will automatically detect the speed and cable type.

To uplink the Switch using the miniGBIC port, connect a miniGBIC module to a miniGBIC port whose shared Ethernet port is not being used (a miniGBIC port and its shared Ethernet port cannot be used at the same time). The following table shows which Ethernet ports are shared with the miniGBIC ports.

Ethernet Ports Shared with miniGBIC Ports

Switch	Port Shared with miniGBIC1	Port Shared with miniGBIC2
SLM2048	24	48
SLM2024	12	24
SLM248G, SLM248P, SLM224G, SLM224P	G1	G2

To establish a Gigabit Ethernet connection using a miniGBIC port, you will need to install a MGBT1, MGBSX1, or MGBLH1 Gigabit expansion module and use Category 5e cabling or fiber optic cabling.

To establish a Fast Ethernet connection using a miniGBIC port, you will need to install a MFEFX1 (100BASE-FX) or MFELX1 (100BASE-LX) 100SFP Transceiver and use fiber optic cabling.

The hardware installation is complete. Proceed to "Chapter 4: Configuration Using the Web-based Utility", for directions on how to set up the Switch.

Chapter 4: Configuration Using the Web-based Utility

This chapter describes the features included in the Web-based Utility. All features shown in this chapter, unless specifically identified, are included in the all of Smart Switches. Unique features for specific Switches are noted.

NOTE: The web-based utility is optimized for a screen resolution of 1024 x 768. Internet Explorer version 5.5 or above is recommended..

To use the utility, open your web browser, enter **http://192.168.1.254** in the *Address* field, then press **Enter**.

Address Bar

NOTE: The default IP address is **192.168.1.254**. If you have changed the IP address or are using DHCP to assign it, enter the new IP address instead. The computer you use for configuration should be on the same subnet as the Switch.

The *Login* screen appears. Enter **admin** in the *Username* field and enter the password in the *Password* field. If this is the first time you are using the utility, leave the *Password* blank. Then press **OK** to log in. The Setup tab's *Summary* screen appears.

(After you have completed your first login, for security purposes it is recommended that you set a password at a later time. For detailed information on changing the password, refer to section "Admin > User Authentication.")

Login Screen

Each time you log in, the web-based utility first displays the Setup tab's *Summary* screen. To access another screen, you first select the appropriate category from among the 10 tabs that appear at the top of the screen: **Setup**, **Port Management**, **VLAN Management**, **Statistics**, **Security**, **QoS**, **Spanning Tree**, **Multicast**, **Admin**, and **Logout**. Then, select the desired screen from the list directly below the tab names.

Setup

The Setup tab contains the *Summary* screen. This screen displays basic system information.

Setup > Summary

The *Summary* screen displays a summary of Switch information. The settings shown cannot be modified from the *Summary* screen; however, many of them can be modified from the Setup tab's *Network Settings* screen.

Setup > Summary

At the top of the *Summary* screen, an image of the Switch's front panel provides the following color-coded status information for the Switch's Ethernet ports:

Green Indicates that the port has a connection.

Gray Indicates that the port has no connection.

Orange Indicates that the port has been closed down by the administrator.

Click on a port to display that port's statistics.

NOTE: The port colors in the *Summary* screen are not related to the colors of the LEDs on the Switch's ports. The port LEDs display different status information, as described in "Chapter 2: Overview."

The Summary screen two sections: *Device Information* and *System Information*. These are described below.

Device Information

System Name Displays the name of the Switch, if one has been entered on the Setup tab's *Network Settings* screen.

IP Address The IP address assigned to the Switch. The Switch's default IP address is **192.168.1.254**. This setting can be configured from the Setup tab's *Network Settings* screen.

Subnet Mask The Subnet Mask assigned to the Switch. The default subnet mask is **255.255.255.0**. This setting can be configured from the Setup tab's *Network Settings* screen.

DNS Server The IP address of your ISP's server that translates the names of websites into IP addresses. This setting can be configured from the Setup tab's *Network Settings* screen.

Default Gateway The IP address of the gateway router between the Switch and management stations on other network segments. The default Gateway Address is **0.0.0.0**. This setting can be configured from the Setup tab's *Network Settings* screen.

NOTE: The Default Gateway cannot be configured if the system IP address is set to **192.168.1.254**. (The system IP Address is set using Setup > Network Settings.).

Address Mode Specifies whether IP functionality is enabled via manual configuration (**Static**) or Dynamic Host Configuration Protocol (**DHCP**). This setting can be configured from the Setup tab's *Network Settings* screen. The default setting is **DHCP**.

Base MAC Address Displays the MAC address of the Switch.

System Information

NOTE: The **Jumbo Frame** setting applies ONLY to the **SLM2024** and **SLM2048** Smart Switches. Other Smart Switches do not support this feature.

Jumbo Frame (SLM2024 and SLM2048 only) This setting enables or disables Jumbo frames on the Switch. A maximum packet size of 9 KB is supported. Jumbo frames allow data to be transmitted using fewer frames, providing lower overhead, quicker processing time, and fewer interruptions. Select either **Enable** to enable the Jumbo frames feature, or **Disable** (default) to disable it.

Model Name Displays the model name of the Switch.

Hardware version Displays the Switch's current hardware version.

Boot Version Displays the current boot version of the Switch.

Firmware Version Displays the Switch's current software version

System Location Displays the location of the system if it has been defined. This setting can be configured from the Setup tab's *Network Settings* screen.

System Contact The name of the administrator appears here, if one has been defined. This setting can be configured from the Setup tab's *Network Settings* screen.

System Up Time Displays the length of time that has elapsed since the Switch was last reset.

Current Time Displays the current time. This setting can be configured from the Setup tab's *Time* screen.

Click **Save Settings** to save your changes. Click **Cancel Changes** to cancel your changes.

Setup > Network Settings

Setup > Network Settings

The *Network Settings* screen allows you to edit the following information. Many of these fields are displayed on the *Summary* screen where they cannot be edited.

Identification

System Name Specifies the name of the Switch. Enter the name into the text field provided. By default, a system name is not defined.

System Location This field is used to enter a description of where the Switch is physically located, such as **3rd Floor**.

System Contact Enter the name of the administrator responsible for the system.

Base MAC Address Displays the physical address of the Switch.

IP Configuration

Management VLAN This drop-down menu allows you to select the Management VLAN. The default value is **1**.

WARNING: The Management VLAN must be set to **1** (default VLAN) if the system IP address (*IP Address* field) is set to **192.168.1.254**. Otherwise, you may not be able to access the system.

IP Address Mode Specifies whether IP functionality is enabled via manual configuration (Static) or Dynamic Host Configuration Protocol (DHCP). Select **Static** or **DHCP** from the drop-down menu. Selecting Static will allow you to enter a static IP address, subnet mask and default gateway using the text field provided. The default setting is **DHCP**.

IP Address If you are using a static IP address, enter the IP address here. The Switch's default IP address is **192.168.1.254**.

Subnet Mask If you are using a static IP address, enter the subnet mask for the currently configured IP address. The default subnet mask is **255.255.255.0**.

Default Gateway If you are using a static IP address, enter the IP address of the default gateway. The default value is **0.0.0.0**.

DNS Server If you are using a static IP address, enter the IP address of the DNS server. A second DNS address can be specified in the additional text field provided.

Click **Save Settings** to save your changes. Click **Cancel Changes** to cancel your changes.

Setup > Time

The *Time* screen allows you to configure the time settings for the Switch.

Setup > Time

Local Time

This is where you set the system date and time for the Switch. All values noted as "two-digit" must consist of two digits; values less than 10 must have a leading zero (for example, **01** instead of **1**).

Hours Enter the two-digit hour here.

Minutes Enter the two-digit minutes here.

Seconds Enter the two-digit seconds here.

Month Enter the two-digit month here.

Day Enter the two-digit day here.

Year Enter the last two digits of the year here (for example, **07** instead of **2007**).

Time Zone Select your time zone from the drop-down menu. Time zones are identified by the difference between Greenwich Mean Time (GMT) and local time.

Daylight Saving

This is where you configure Daylight Saving Time.

Daylight Saving Enable daylight saving time by checking the checkbox.

Time Set Offset Custom daylight saving time is set by entering the time difference in minutes into the *Time Set Offset* field. The default offset is 60 minutes.

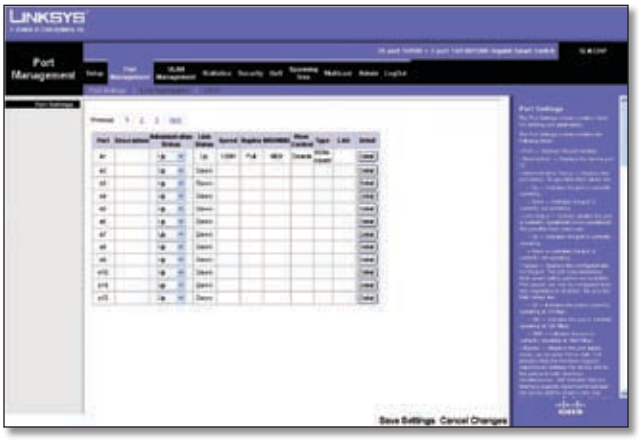
Port Management

The Port Management tab contains the *Port Settings*, *Link Aggregation*, and *LACP* screens. On the SLM224P and SLM248P only, this tab also contains the *PoE Power Settings* screen.

Port Management > Port Settings

You use the *Port Settings* screen to display the speed, duplex mode, and flow control used on specific ports, or use to detect the connection settings used by the attached device. Use the full-duplex mode on ports whenever possible to double the throughput of switch connections. Flow control should also be enabled to control network traffic during periods of congestion and prevent the loss of packets when port buffer thresholds are exceeded. The Switch supports flow control based on the IEEE 802.3x standard.

The information on the *Port Settings* screen is read-only. To edit this information, click **Details** to the right of a port's information to edit that port's settings using the *Port Configuration* screen. For detailed information on the *Port Configuration* screen, refer to the "*Port Configuration*" section.



Port Management > Port Settings

The *Port Settings* screen displays the following information. For information on these settings, refer to the "*Port Configuration*" section.

Port The port number.

Description The user-defined port description.

Administrative Status The port's administrative status.

Link Status The port's operational status.

Speed The port's configured rate in Mbps.

Duplex The port's current duplex mode.

MDI/MDIX The port's MDI/MDIX type.

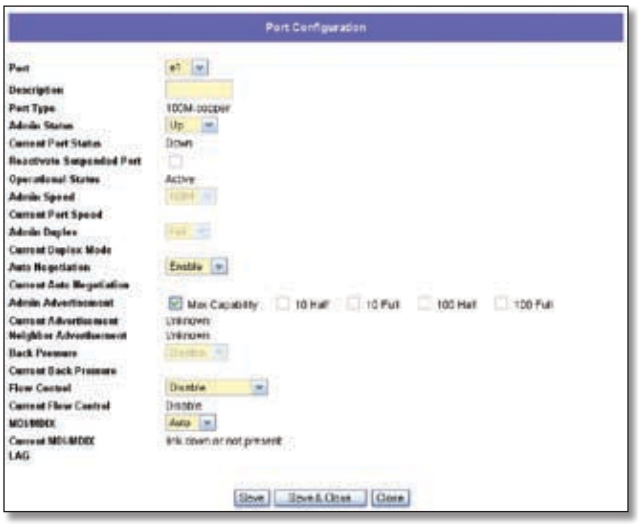
Flow Control The type of flow control currently in use.

Type The port type.

LAG The LAG to which the port belongs, if the port is a LAG member.

Port Configuration

The *Port Configuration* screen lets you configure a port. You can enable/disable the interface, and set the port's capability advertisements, speed, duplex mode, and flow control. To use this screen, click **Detail** in the *Detail* column on the *Port Settings* screen.



Port Management > Port Settings> Port Configuration

The *Port Configuration* screen contains the following fields ("Read-only" indicates that a field cannot be edited)."

Port The port number. To edit the information for another port, select the port from the drop-down menu. (Port numbers consist of either "e" for Ethernet, or "g" for Gigabit, followed by the appropriate number.)

Description The user-defined port description of up to 64 characters. This field is blank by default.

Port Type (Read-only) The port's connection type and speed. The types are:

- **copper** The port has a copper connection.
- **ComboC** The Gigabit port has a copper connection.
- **ComboF** The Gigabit port has a fiber optic connection.

The port speed is prefixed onto the type, for example **10M-copper** indicates a 10 Mbps copper connection.

Admin Status The port's administrative status. Select either **Up** or **Down** to enable or disable traffic forwarding through the port.

Current Port Status (Read-only) The port's connection status, either **Up** or **Down**.

Reactivate Suspended Port If the port has been suspended, select this checkbox to reactivate the port.

Operational Status (Read-only) Displays whether the port is operational or non-operational.

Admin Speed Use this to manually set the port's configured transmission rate in Mbps. You can select **10M**, **100M**, or **1000M** (Gigabit ports only). Before you change this setting, make sure that *Auto Negotiation* is disabled.

Current Port Speed (Read-only) The port's current rate in Mbps.

Admin Duplex The port's duplex mode, either **Full** or **Half**.

Current Duplex Mode (Read-only) The port's current duplex mode.

Auto Negotiation Select **Enable** (default) or **Disable** to enable or disable Auto-Negotiation on the port. Auto-Negotiation allows a port to advertise its transmission rate, duplex mode, and flow control settings to other ports.

Current Auto Negotiation (Read-only) The port's current Auto-Negotiation status.

Admin Advertisement Select the speed(s) and duplex mode(s) that the port will advertise. The available speeds are determined by the port type. The following capabilities are supported.

- **Max Capability** The port advertises all speeds and duplex mode settings.
- **10 Half** The port advertises 10 Mbps half-duplex operation.
- **10 Full** The port advertises 10 Mbps full-duplex operation.
- **100 Half** The port advertises 100 Mbps half-duplex operation.
- **100 Full** The port advertises 100 Mbps full-duplex operation.
- **1000 Full** (Gigabit ports only) The port advertises 1000 Mbps full-duplex operation.

Current Advertisement (Read-only) The speed and duplex mode settings that the port is currently advertising.

Neighbor Advertisement (Read-only) The speed and duplex mode settings that the neighbor port (the port to which the selected port is connected) is advertising. If the port has no neighbor port, this field displays "Unknown."

Back Pressure Select **Enable** or **Disable** (default) to enable or disable Back Pressure mode on the port.

Current Back Pressure (Read-only) The current Back Pressure mode on the port.

Flow Control Select **Enable** or **Disable** to manually enable or disable flow control, or select **Auto-Negotiation** for automatic selection of flow control on the port.

Current Flow Control (Read-only) The current flow control setting.

MDI/MDIX Select the port's MDI/MDIX type, either **MDI**, **MDIX**, or **Auto** (automatically detect type). The **MDI** setting is used if the port is connected to an end station. The **MDIX** setting is used if the port is connected to a hub or another switch.

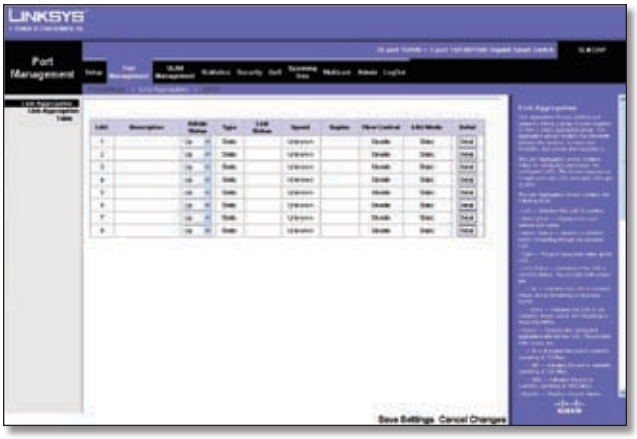
Current MDI/MDIX (Read-only) The port's current MDI/MDIX type.

LAG (Read-only) The LAG to which this port belongs, if the port is a LAG member.

Click **Save** to save the settings and leave the screen open. Click **Save & Close** to save the settings and close the screen. Click **Close** to close the screen without saving the settings.

Port Management > Link Aggregation

You can create multiple links between devices that work as one virtual, aggregate link. This is known as a Link Aggregrated Group (LAG). LAGs offers a dramatic increase in bandwidth for network segments where bottlenecks exist, as well as providing a fault-tolerant link between two devices. You can create up to eight LAGs on the Switch. Each LAG can contain up to eight ports.



Port Management > Link Aggregation

LAG The LAG number (1-8).

Description The user-defined description for the LAG.

Admin Status The administrative status of the interface. To change it, select **Up** to enable the interface, or **Down** to disable it.

Type Indicates if a LAG has been manually configured (static) or dynamically set through LACP.

Link Status Displays the status of the link.

Speed Displays the port speed.

Duplex Displays the duplex mode.

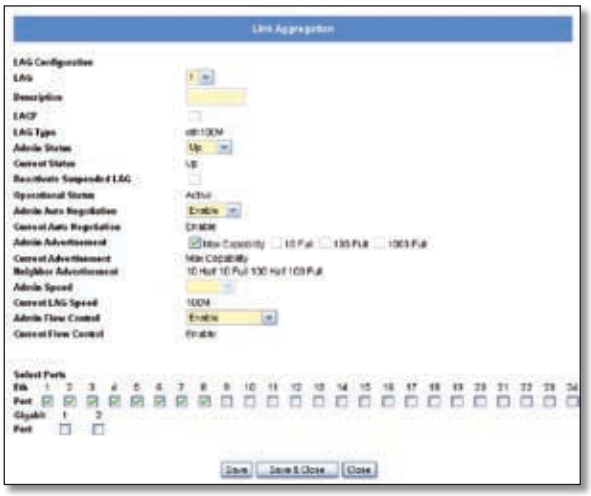
Flow Control Displays the flow control.

LAG Mode Displays the LAG mode.

Detail To create a new LAG, click **Detail** in the *Detail* column to display the *Link Aggregation* detail screen.

LAG Configuration

The *Link Aggregation* detail screen lets you configure a LAG. You can create a LAG, select its ports, enable/disable the LAG, and set the capability advertisements, speed, duplex mode, and flow control. To use this screen, click **Detail** on the *Port Settings* screen.



Port Management > Link Aggregation > Detail

LAG The LAG number (**1**-**8**). To display or edit another LAG, select the number from the drop-down menu.

Description The user-defined LAG description of up to 64 characters. This field is blank by default.

LACP Select the checkbox to enable Link Aggregation Control Protocol (LACP).

LAG Type (Read-only) The LAG type. The possible values are:

- **eth100m** The LAG contains 100 Mbps Ethernet ports.
- **eth1000m** The LAG contains 1000 Mbps Ethernet ports.

Admin Status The LAG's administrative status. Select either **Up** or **Down** to enable or disable the LAG.

Current Status (Read-only) The LAG's status, either **Up** or **Down**.

Reactivate Suspended LAG If the LAG has been suspended, select this checkbox to reactivate the LAG.

Operational Status (Read-only) Displays whether the LAG is operational or non-operational.

Admin Auto Negotiation Select **Enable** (default) or **Disable** to enable or disable Auto-Negotiation on the LAG. Auto-Negotiation allows a LAG to advertise its transmission rate, duplex mode, and flow control settings to other LAGs.

Current Auto Negotiation (Read-only) The LAG's current Auto-Negotiation status.

Admin Advertisement Select the capabilities (speeds and duplex modes) that the LAG will advertise. The available speeds are determined by the LAG port type. The duplex mode must be full-duplex. The following capabilities are supported.

- **Max Capability** The LAG advertises all port speeds in full-duplex mode.
- **10 Full** The LAG advertises 10 Mbps full-duplex operation.
- **100 Full** The LAG advertises 100 Mbps full-duplex operation.
- **1000 Full** (Gigabit ports only) The LAG advertises 1000 Mbps full-duplex operation.

Current Advertisement (Read-only) The speed and duplex mode settings that the LAG is currently advertising.

Neighbor Advertisement (Read-only) The speed and duplex mode settings that the neighbor port (the port to which the selected LAG is connected) is advertising. If the LAG has no neighbor port, this field displays "Unknown."

Admin Speed Use this to manually set the LAG's configured transmission rate in Mbps. You can select **10M**, **100M**, or **1000M** (Gigabit ports only). Before you change this setting, make sure that *Admin Auto Negotiation* is disabled.

Current LAG Speed (Read-only) The LAG's current rate in Mbps.

Admin Flow Control Select **Enable** or **Disable** to manually enable or disable flow control, or select **Auto-Negotiation** for automatic selection of flow control.

Current Flow Control (Read-only) The current flow control setting.

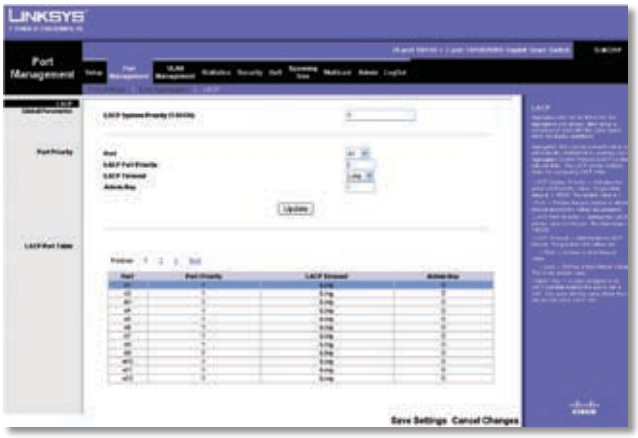
Select Ports To add a port to the LAG, select its checkbox in this section. You can select up to 8 ports per LAG.

Click **Save** to save the settings and leave the screen open. Click **Save & Close** to save the settings and close the screen. Click **Close** to close the screen without saving the settings.

Port Management > LACP

In addition to LAGs that you create by manually grouping ports together, you can also use the Link Aggregation Control Protocol (LACP) to automatically negotiate a LAG link between the Switch and another network device.

The *LACP* screen contains fields for configuring LACP LAGs. This screen is divided into three parts: *Global Parameter, Port Priority*, and *LACP Port Table*.



Port Management > LACP

Global Parameter

LACP System Priority The global LACP priority value, from **1** to **65535**. The default value is **1**.

Port Priority

Port The port number to which the timeout and priority values are assigned. To configure a different port, select it from the drop-down menu. If you do not see the port you want, click **Next** in the *LACP Port Table*.

LACP Port Priority Defines the LACP priority value for the port, from **1** to **65535**. The default value is **1**.

LACP Timeout The administrative LACP timeout value. Select either **Short** or **Long** (default).

Admin Key (Read-only) A channel will only be formed between ports with the same admin key. This only applies to ports located on the same switch.

When you are finished entering the settings above, click **Update** to apply the settings.

LACP Port Table

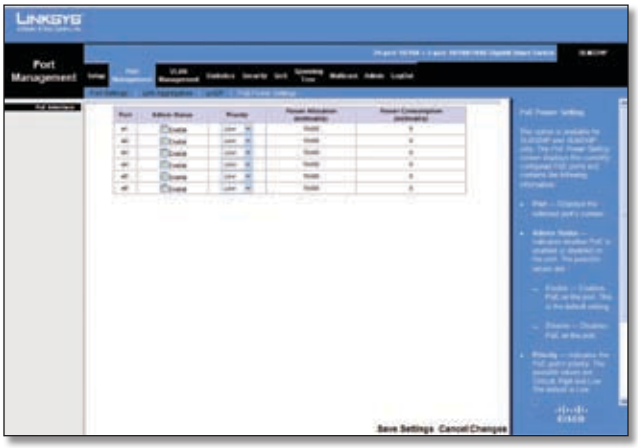
This section provides a read-only display of the current LACP settings.

After you are finished setting the LACP parameters, click **Save Settings** to save the settings, or click **Cancel Changes** to cancel your changes.

Port Management > PoE Power Settings

NOTE: This section applies ONLY to the **SLM224P** and **SLM248P** Smart Switches.

The *PoE Power Settings* screen allows you to configure the Power over Ethernet (PoE) ports on the Switch.



Port Management > PoE Power Settings

Port Displays the port number.

Admin Status Check the checkbox to enable PoE power to be supplied to the connected device.

Priority Select **Critical**, **High**, or **Low** (default) from the drop-down menu to set the priority of the port.

Power Allocation (milliwatts) Sets the maximum power in milliwatts that can be supplied to the port.

Power Consumption (milliwatts) Displays the power currently being used by the connected PoE device.

Click **Save Settings** to save the changes, or click **Cancel Changes** to cancel your changes.

VLAN Management

A VLAN is a group of ports that can be located anywhere in the network, but communicate as though they belong to the same physical segment.

VLANs help to simplify network management by allowing you to move devices to a new VLAN without having to change any physical connections. VLANs can be easily organized to reflect departmental groups (such as Marketing or R&D), usage groups (such as e-mail), or multicast groups (used for multimedia applications such as videoconferencing). You can create up to 128 VLANs on the Switch.

VLAN Management > Create VLAN

The *Create VLAN* screen lets you create and configure global parameters for VLANs.

VLAN Management > Create VLAN

Single VLAN

To create a single VLAN, enter the VLAN ID and VLAN Name, up to 32 characters long, and click **Add**.

VLAN ID ID of configured VLAN (**2**-**4093**, no leading zeroes).

VLAN Name Name of the VLAN. (1 to 32 characters)

VLAN Range

To create a range of VLANs, enter the range of their IDs in the *VLAN Range* fields and then click **Add Range**.

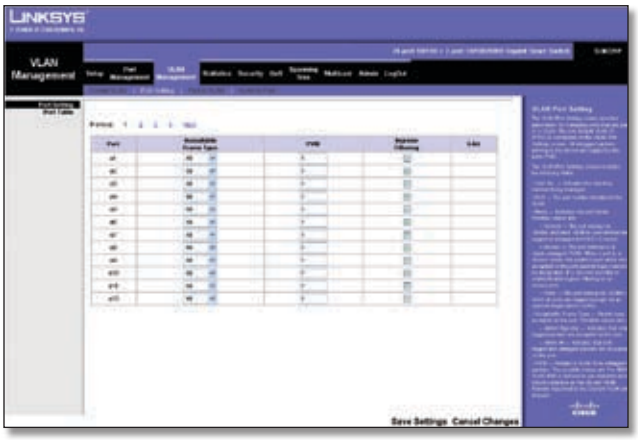
VLAN Table

This section lists the current VLANs in tabular format. For each VLAN, it displays the VLAN's ID, name, and status. The status values are **Static** (user-defined VLAN) or **Default** (default VLAN). The total number of VLANs is also shown.

To remove a VLAN or a range of VLANs, select the VLANs in the VLAN Table, then click **Delete**.

VLAN Management > Port Settings

The Port Settings screen allows you to configure the ports in a VLAN.



VLAN Management > Port Settings

You can configure VLAN behavior for specific ports, including the accepted frame type, VLAN identifier (PVID), and ingress filtering.

Port The number of the port.

Acceptable Frame Type This specifies the type of frames that the port will accept. If **All** (default) is selected, the port will accept all frame types, including tagged or untagged frames. If **Tagged** is selected, the port accepts only tagged frames. When set to **All**, any untagged frames that are received are assigned to the default VLAN.

PVID Use this field to select the VLAN ID that will be assigned to untagged frames received on the port. Valid IDs are **1** (default) to **4093**. VLAN 4094 is reserved for internal use. VLAN 4095 is defined per standard and industry practice as the Discard VLAN. Frames tagged for the Discard VLAN are dropped.

Ingress Filtering Enables or disables Ingress filtering on the port. Ingress filtering discards packets that do not include an ingress port. The default is Enabled.

LAG Displays the LAG, if any, to which the port belongs. A port's LAG settings override the VLAN port settings.

Click **Save Changes** to save your changes, or click **Cancel Changes** to cancel.

VLAN Management > Port to VLAN

You use the *Port to VLAN* screen to add ports to a VLAN and delete ports from a VLAN. When you add a port to a VLAN, you also specify whether the port is tagged or untagged.

The *Port to VLAN* screen contains a Port Table with VLAN parameters for each port. To add a port to or delete a port from the VLAN, you select the port's appropriate configuration options from this table.

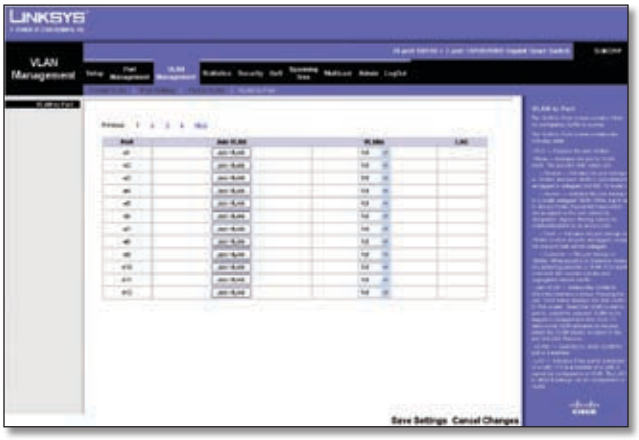
VLAN Management > Port to VLAN

Select VLAN Select the ID of the VLAN whose port membership you are configuring. For each port in the VLAN, select the appropriate configuration option:

- **Tagged** The interface is a member of the VLAN. All packets transmitted by the port will be tagged and will carry VLAN information.
- **Untagged** The interface is a member of the VLAN. All packets transmitted by the port will be untagged and will not carry VLAN information.
- **Excluded** The interface is excluded from the VLAN. This is the default option.

VLAN Management > VLAN to Port

The *VLAN to Port* screen displays each port's VLAN membership information. It is also used to add a port to or delete a port from a VLAN.



VLAN Management > VLAN to Port

Port The number of the port being configured.

Join VLAN To configure the port's VLAN membership, press **Join VLAN** to bring up the *Join VLAN to Port* screen.

VLANs Displays the IDs of the VLANs to which the port belongs, prefixed by "T" if the port is tagged or "U" if the port is untagged in that VLAN.

LAG Displays the LAG to which the port belongs, if any. If a port belongs to a LAG, it cannot belong to a VLAN. However, the LAG to which the port belongs can be configured to belong to a VLAN.

Join VLAN to Port

The *Join VLAN to Port* screen appears when you click the **Join VLAN** button for a port in the *VLAN to Port* screen. You use this screen to configure the port's VLAN membership.

VLAN Management > VLAN to Port > Join VLAN to Port

Select VLAN This contains two fields. The field on the left side of the screen lists the IDs of all available VLANs to which the port can belong, while the field on the right side lists the IDs of the VLANs to which the port already belongs. Each VLAN ID is prefixed by "T" if the port is tagged or by "U" if the port is untagged on the respective VLAN.

Add To add the selected port to one of the available VLANs, select the desired VLAN from the left side of the screen, then select the desired *Tagging* option and click **Add**. The VLAN ID will appear on the right side with the appropriate prefix indicating a tagged or untagged port.

Remove To remove the selected port from a VLAN, select the VLAN from the right side of the screen and click **Remove**. The VLAN ID appears on the left side of the screen without the "T" or "U" prefix.

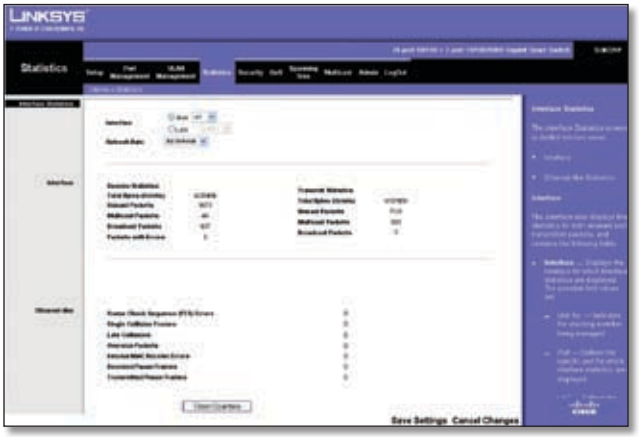
Tagging When you are adding a port to a VLAN, select the appropriate option to specify whether the port is **Tagged** (default) or **Untagged**.

Click **Save** to save your changes and leave the screen open, **Save & Close** to save your changes and close the screen, or click **Close** to close the screen without saving your changes.

Statistics

The Statistics tab contains the *Interface Statistics* screen, which lets you display statistics for a specified interface.

Statistics > Interface Statistics



Statistics > Interface Statistics

This screen allows you to display statistics for the Ethernet port or LAG that you specify. You can also specify the rate at which the display will be refreshed.

Interface To display statistics for an Ethernet port, select **Port**, then select the desired port from the drop-down menu. To display statistics for a LAG, select **LAG** and then select the desired LAG from the drop-down menu.

Refresh Rate Select the rate at which to refresh the statistics display. The values are **15 sec**, **30 sec**, **60 sec**, and **No Refresh** (default).

Interface

This section displays statistics for the packets transmitted and received on the selected interface.

Receive Statistics Statistics on received packets

- **Total Bytes (Octets)** Displays the number of octets received on the selected interface.
- **Unicast Packets** Displays the number of Unicast packets received on the selected interface.
- **Multicast Packets** Displays the number of Multicast packets received on the selected interface.
- **Broadcast Packets** Displays the number of Broadcast packets received on the selected interface.
- **Packets with Errors** Displays the number of error packets received from the selected interface.

Transmit Statistics Statistics on transmitted packets

- **Total Bytes (Octets)** Displays the number of octets transmitted from the selected interface.
- **Unicast Packets** Displays the number of Unicast packets transmitted from the selected interface.
- **Multicast Packets** Displays the number of Multicast packets transmitted from the selected interface.
- **Broadcast Packets** Displays the number of Broadcast packets transmitted from the selected interface.

Ethernet-like

This section displays the following statistics for the selected interface.

Frame Check Sequence (FCS) Errors Displays the number of FCS errors received on the selected interface.

Single Collision Frames Displays the number of single collision frames received on the selected interface.

Late Collisions Displays the number of late collision frames received on the selected interface.

Oversize Packets Displays the number of oversize packet errors on the selected interface.

Internal MAC Receive Errors Displays the number of internal MAC received errors on the selected interface.

Received Pause Frames Displays the number of received paused frames on the selected interface.

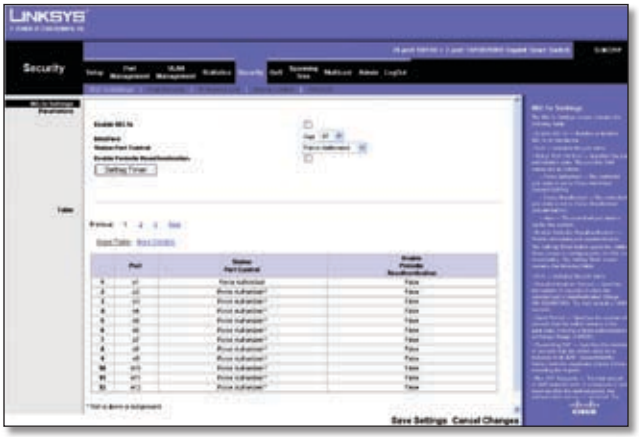
Transmitted Pause Frames Displays the number of paused frames transmitted from the selected interface.

Clear Counters Click the **Clear Counters** button to reset all the counters on this screen to zero.

Security

Security > 802.1x Settings

The *802.1x Settings* screen is used to configure a port's 802.1x authentication settings.



Security > 802.1x Settings

Port-based authentication enables authenticating system users on a per-port basis via an external server. Only authenticated and approved system users can transmit and receive data. Ports are authenticated via a RADIUS server using the Extensible Authentication Protocol (EAP).

Parameters

Enable 802.1x Select the checkbox to enable 802.1x authentication. The default is not enabled.

Interface The interface on which to configure 802.1x.

- **Port** Select the port from the drop-down menu.

Status Port Control Sets the port authentication mode top one of the following options:

- **ForceAuthorized** (Default) Forces the port to grant access to all clients, either dot1x-aware or otherwise.
- **ForceUnauthorized** Forces the port to deny access to all clients, either dot1x-aware or otherwise.
- **Auto** Requires a dot1x-aware client to be authorized by the authentication server. Clients that are not dot1x-aware will be denied access.

Enable Periodic Reauthentication Select the checkbox to permit periodic port reauthentication.

Setting Timer Click this button to open the *Setting Timer* screen to configure ports for 802.1x functionality.

Update If you click this button, your changes are saved and appear immediately in the screen's *Table* section.

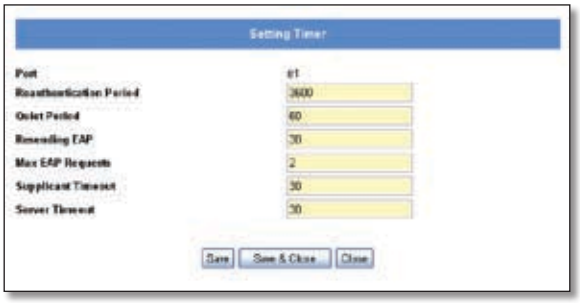
Table

This part of the *802.1x Settings* screen displays a summary of the settings that appear in the *Parameters* section of the screen. If you click **More Details**, the settings described in the "Setting Timer" section are added to the table.

Click **Save Settings** to apply the changes, or **Cancel Changes** to cancel the changes.

Setting Timer

The *Setting Timer* screen appears when you click **Setting Timer** on the *802.1x Settings* screen. You use the *Setting Timer* screen to configure a port's 802.1x functionality.



Security > 802.1x Settings > Setting Timer

Port Displays the port name.

Reauthentication Period Specifies the number of seconds after which a connected client must be reauthenticated. The range is **300** to **4294967295** seconds. The default value is **3600** seconds.

Quiet Period Specifies the time that a switch port waits after **Max EAP Requests** is exceeded before attempting to acquire a new client. The range is **0** to **65535** seconds. The default is **60** seconds.

Resending EAP Specifies the time that the switch waits for a response to an EAP request/identity frame from the client before retransmitting an EAP packet. The range is **1** to **65535** seconds. The default is **30** seconds.

Max EAP Requests Specifies the maximum number of times the switch port will retransmit an EAP request packet to the client before it times out the authentication session. The range is **1** to **10** times. The default is **2** retries.

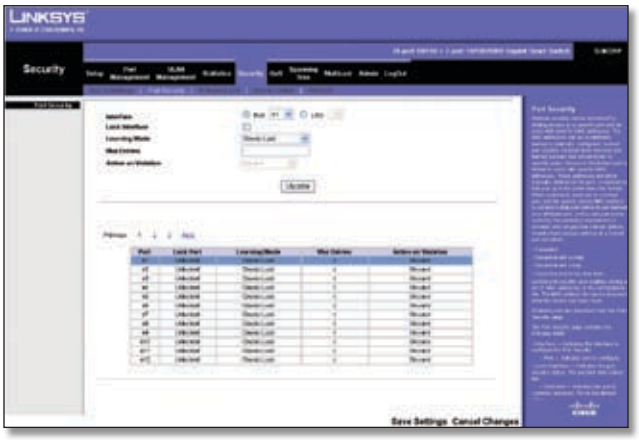
Supplicant Timeout Displays the number of seconds that lapses before EAP requests are resent to the supplicant. The range is **1** to **65535** seconds. The default is **30** seconds.

Server Timeout The number of seconds that lapses before the switch resends a request to the authentication server The range is **1** to **65535**. The default is **30** seconds.

Click **Save** to save your changes and leave the screen open. Click **Save & Close** to save your changes and close the screen. Click **Close** to close the screen without saving your changes.

Security > Port Security

The *Port Security* screen is used to configure a port's security settings.



Security > Ports Security

Network security can be increased by limiting access on a specific port only to users with specific MAC addresses. MAC addresses can be dynamically learned or statically configured.

Locked port security monitors both received and learned packets that are received on specific ports. Access to the locked port is limited to users with specific MAC addresses. These addresses are either manually defined on the port, or learned on that port up to the point when it is locked. When a packet is received on a locked port, and the packet's source MAC address is not tied to that port (either it was learned on a different port, or it is unknown to the system), the protection mechanism is invoked, and can provide various options. Unauthorized packets arriving at a locked port are either:

- Forwarded
- Discarded
- Cause the port to be shut down

Locked port security also enables storing a list of MAC addresses in the configuration file. The MAC address list can be restored after the device has been reset.

Disabled ports can be reactivated from the *Port Settings* screen of the Port Management tab.

Interface Select **Port** or **LAG**, then select the desired interface from the appropriate drop-down menu.

Lock Interface Select this option to lock the interface. The default is not selected (interface not locked).

Learning Mode Defines the locked port type. This field is enabled only if **Lock Interface** is not selected. The possible values are:

- **Classic Lock** Locks the port using the classic lock mechanism. The port is immediately locked, regardless of how many addresses have already been learned.
- **Limited Dynamic Lock** Locks the port by deleting the current dynamic MAC addresses associated with the port. The port learns up to the maximum number of addresses allowed on the port. Both relearning and aging MAC addresses are enabled.

In order to change the *Learning Mode*, the *Lock Interface* must be unselected. Once the *Learning Mode* is changed, the *Lock Interface* can be reinstated.

Max Entries Specifies the number of MAC addresses that can be learned on the port. This field is enabled only if *Learning Mode* is set to **Limited Dynamic Lock**. The default value is **1**.

Action on Violation Indicates the action to be applied to packets arriving on a locked port. The possible values are:

- **Discard** Discards packets from any unlearned source. This is the default value.
- **Forward** Forwards packets from an unknown source without learning the MAC address.
- **Shutdown** Discards packets from any unlearned source and shuts down the port. The port remains shut down until reactivated, or until the device is reset.

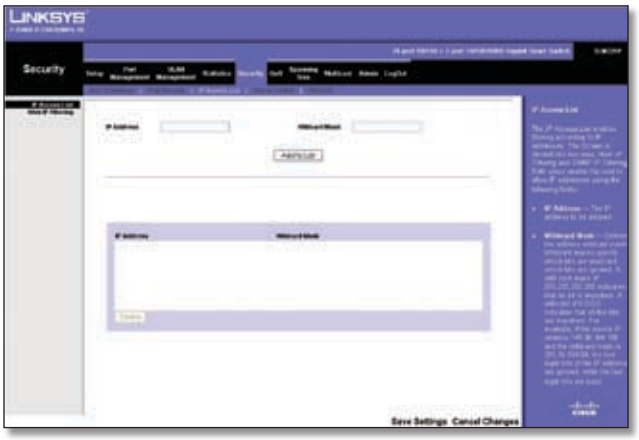
Update If you click this button, your changes are saved and appear immediately in the table at the bottom of the *Port Security* screen.

The lower portion of the *Port Security* screen displays a summary of the settings in the upper portion of the screen. The settings are displayed for each of the ports on the Switch.

Click **Save Settings** to apply the changes, or **Cancel Changes** to cancel the changes.

Security > IP Access List

Use the *IP Access List* (also known as *Management Access List*) screen to specify IP addresses that are to be allowed to manage the device, using an IP address and wildcard mask.



Security > IP Access List

IP Address Enter the IP address to be allowed.

Wildcard Mask Enter the IP address wildcard mask. Wildcard masks specify which bits are used and which bits are ignored. A wild card mask of 255.255.255.255 indicates that no bit is important. A wildcard of 0.0.0.0 indicates that all the bits are important. For example, if the source IP address is 149.36.184.198 and the wildcard mask is 255.36.184.00, the first eight bits of the IP address are ignored, while the last eight bits are used.

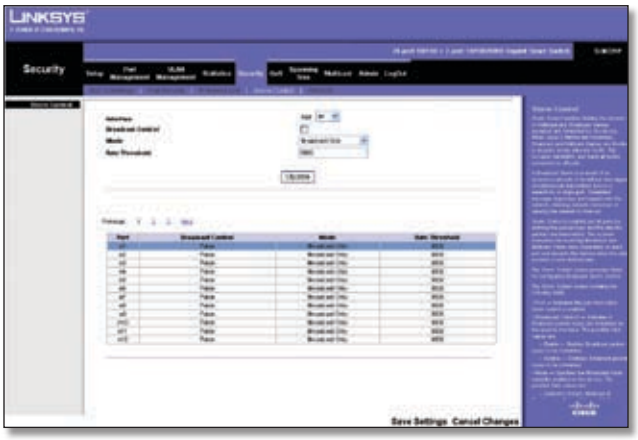
Add to List Click this button to save the IP address and Wildcard Mask. The information will appear in the list at the bottom of the screen.

The bottom portion of the *IP Access List* screen displays the current IP access list, where each entry consists of an IP Address and Wildcard Mask. To delete an entry from the list, select it and click **Delete**.

Click **Save Settings** to apply the changes, or **Cancel Changes** to cancel the changes.

Security > Storm Control

The *Storm Control* screen is used to configure broadcast and multicast storm control.



Security > Storm Control

Storm Control enables limiting the amount of Multicast and Broadcast frames accepted and forwarded by the Switch. A Broadcast Storm results when an excessive amount of broadcast messages is simultaneously transmitted across a network by a single port. Forwarded message responses are heaped onto the network, straining network resources or causing the network to time out.

To enable Storm Control on a port, you specify the packet type (broadcast/multicast) and maximum transmission rate. The system measures the incoming Broadcast and Multicast frame rates separately on each port and discards frames when the rate exceeds the specified maximum.

Interface Indicates the interface from which storm control is enabled.

- **Port** Select the port from the drop-down menu.

Broadcast Control Select the checkbox to apply Broadcast control on the selected interface. Broadcast control limits the amount of Broadcast packet types to be forwarded. The default is not selected (disabled).

Mode Specifies the Broadcast mode currently enabled on the device. The possible values are:

- **Multicast & Broadcast** Counts Broadcast and Multicast traffic together.
- **Broadcast Only** Counts only Broadcast traffic.

Rate Threshold The maximum rate (packets per second) at which unknown packets are forwarded. The ranges are **70** kbps to **100** Mbps for FE ports, and **3.5** to **100** Mbps for GE ports. The default value is **3500** kbps.

The **Update** button adds the Storm Control settings to the Storm Control table at the bottom of the screen.

Security > RADIUS

The *RADIUS* screen is used to configure a Remote Authorization Dial-In User Service (RADIUS) server for user authentication.

Security > RADIUS

RADIUS servers provide additional security for networks by providing a centralized authentication method for web access. Up to eight RADIUS servers can be configured. The Switch attempts authentication using the listed sequence of servers. The process ends when a server either approves or denies access to a user.

IP Address Enter the IP address of the authentication server.

Priority The server priority. The possible values are **0** to **65535**, where 0 is the highest priority. This priority determines the order in which RADIUS servers are queried when more than one RADIUS server is configured. The default priority is **0**.

Authentication Port Enter the authentication port. The authentication port is used to verify the RADIUS server authentication. The default value is **1812**.

Number of Retries Defines the number of transmitted requests sent to RADIUS server before a failure occurs. The possible values are **1** to **10**. The default is **3**.

Timeout for Reply Defines the amount of the time in seconds the device waits for an answer from the RADIUS server before retrying the query, or switching to the next server. The possible values are **1** to **30**. The default is **3**.

Dead Time Defines the amount of time (minutes) that a RADIUS server is bypassed for service requests. The range is **0** to **2000**. The default is **0** minutes.

Key String Defines the default key string used to authenticate and encrypt all RADIUS communications between the device and the RADIUS server. This key must match the RADIUS encryption.

Source IP Address Defines the source IP address that is used for communication with RADIUS servers.

Usage Type Specifies the RADIUS server authentication type. The default value is Login. The possible field values are:

- **Login** Indicates that the RADIUS server is used for authenticating user name and passwords.
- **802.1X** Indicates that the RADIUS server is used for 802.1X authentication.
- **All** Indicates that the RADIUS server is used for authenticating user name and passwords, and 802.1X port authentication.

Click **Add to List** to add the RADIUS configuration to the RADIUS table at the bottom of the screen.

Click **Save Settings** to save the changes, or **Cancel Changes** to cancel the changes.

QoS

Network traffic is usually unpredictable, and the only basic assurance that can be offered is best effort traffic delivery. To overcome this challenge, Quality of Service (QoS) is applied throughout the network. This ensures that network traffic is prioritized according to specified criteria, and that specific traffic receives preferential treatment. QoS in the network optimizes network performance and entails two basic facilities:

Classifying incoming traffic into handling classes, based on an attribute, including:

- The ingress interface
- Packet content
- A combination of these attributes

Providing various mechanisms for determining the allocation of network resources to different handling classes, including:

- The assignment of network traffic to a particular hardware queue
- The assignment of internal resources
- Traffic shaping

The terms Class of Service (CoS) and QoS are used in the following context:

- CoS provides varying Layer 2 traffic services. CoS refers to classifying traffic into traffic classes, where each class is handled as an aggregate whole, with no per-flow settings. CoS is usually related to the 802.1p service that classifies flows according to their Layer 2 priority, as set in the VLAN header.
- QoS refers to Layer 2 traffic and above. QoS handles per-flow settings, even within a single traffic class.

The QoS facility involves the following elements:

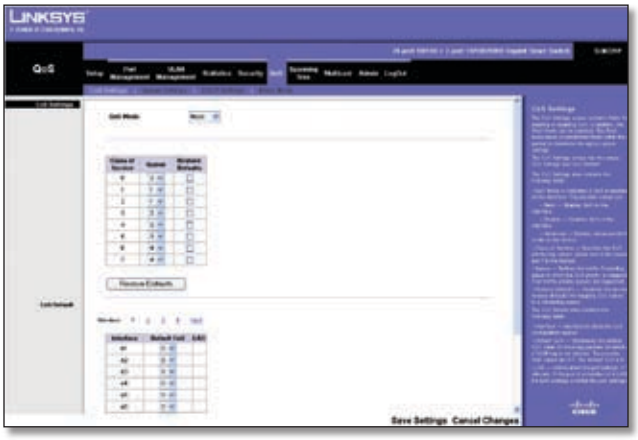
- Traffic Classification—Classifies each incoming packet as belonging to a given traffic class, based on the packet contents and/or the context.
- Assignment to Hardware Queues—Assigns incoming packets to forwarding queues. Packets are sent to a particular queue for handling as a function of the traffic class to which they belong, as defined by the classification mechanism.
- Traffic Class-Handling Attributes—Applies QoS/CoS mechanisms to different classes, including Bandwidth Management.

The QoS configuration options are as follows:

- CoS Settings
- Queue Settings
- DSCP Setting
- Basic Mode

QoS > CoS Settings

The *CoS Settings* screen contains fields for enabling or disabling CoS. This screen contains two sections, *CoS Settings* and *CoS Default*.



QoS > CoS Settings

CoS Settings

QoS Mode Indicates if QoS is enabled. The possible values are:

- **Disable** Disables QoS.
- **Basic** Enables QoS. This is the default value.

Class of Service Specifies the CoS priority tag values, where **0** is the lowest and **7** is the highest.

Queue Defines the traffic forwarding queue to which the CoS priority is mapped. Four traffic priority queues are supported.

Click **Restore Defaults** to restore the device factory defaults for mapping CoS values to a forwarding queue.

CoS Default

Interface The interface to which the CoS configuration applies.

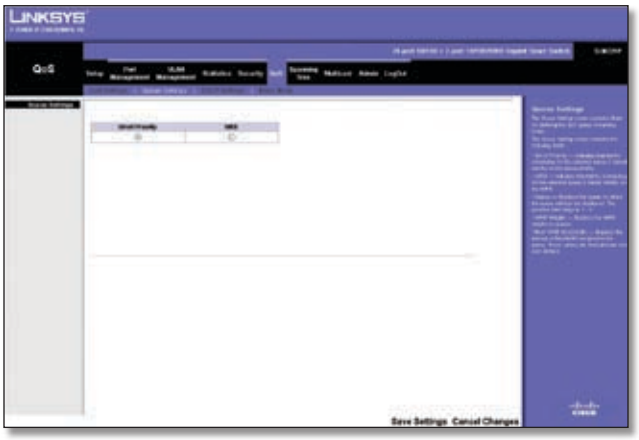
Default CoS Determines the default CoS value for incoming packets for which a VLAN tag is not defined. The possible field values are **0**-**7**. The default CoS is **0**.

LAG The LAG to which the port belongs, if relevant. If the port is a member of a LAG, the LAG settings override the port settings.

Click **Save Settings** to save the changes, or **Cancel Changes** to cancel the changes.

QoS > Queue Settings

The *Queue Settings* screen contains fields for defining the QoS queue forwarding types.



QoS > Queue Settings

Strict Priority Indicates that traffic scheduling for the selected queue is based strictly on the queue priority.

WRR Indicates that traffic scheduling for the selected queue is based strictly on the WRR.

Queue Displays the queue (1-4) for which the queue settings are displayed.

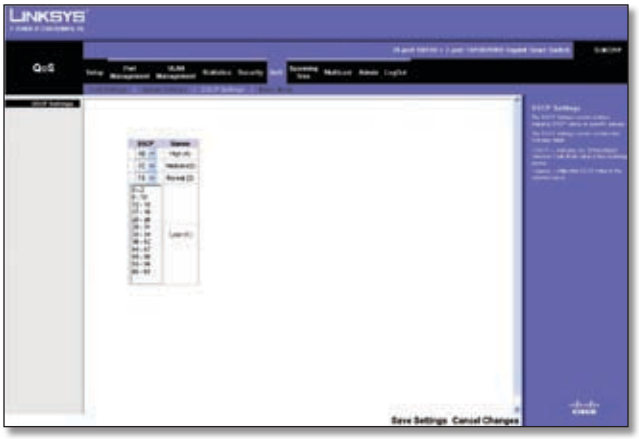
WRR Weight Displays the WRR weights to queues.

% of WRR Bandwidth Displays the percentage of bandwidth assigned to the queue. These values are fixed and cannot be modified.

Click **Save Settings** to save the changes, or **Cancel Changes** to cancel the changes.

QoS > DSCP Settings

The *DSCP Settings* screen allows you to map Differentiated Services Code Point (DSCP) values to specific queues.



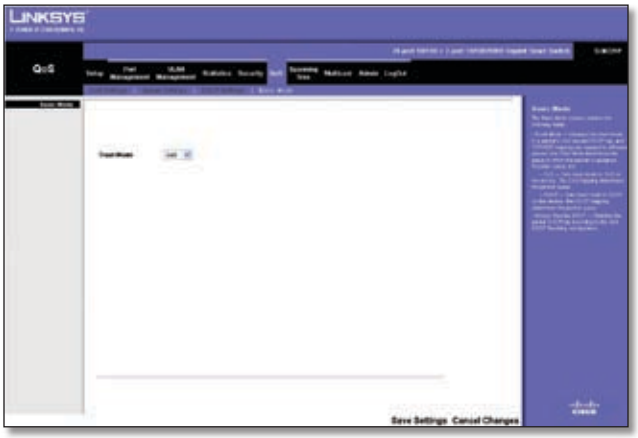
QoS > DSCP Settings

DSCP Indicates the DSCP value in the incoming packet. Select a DSCP value from the drop-down menu to map that value to the associated queue. You can select the DSCP value for the High, Medium, and Normal priority queues. The DSCP values for the Low priority queue are selected automatically based on the other DSCP values.

Queue The queue (1-4) to which the DSCP value is being mapped.

Click **Save Settings** to save the changes, or **Cancel Changes** to cancel the changes.

QoS > Basic Mode



QoS > Basic Mode

The *Basic Mode* screen contains the following fields:

Trust Mode Displays the trust mode. If a packet's CoS tag and DSCP tag are mapped to different queues, the Trust Mode determines the queue to which the packet is assigned. Possible values are:

- **CoS** Sets trust mode to CoS on the device. The CoS mapping determines the packet queue
- **DSCP** Sets trust mode to DSCP on the device. The DSCP mapping determines the packet queue.

Click **Save Settings** to save the changes, or **Cancel Changes** to cancel the changes.

Spanning Tree

Spanning Tree Protocol (STP) provides tree topography for any arrangement of bridges. STP also provides one path between end stations on a network, eliminating loops.

Loops occur when alternate routes exist between hosts. Loops in an extended network can cause bridges to forward traffic indefinitely, resulting in increased traffic and reducing network efficiency.

The Switch supports the **Classic STP** version of STP, which provides a single path between end stations, avoiding and eliminating loops.

Spanning Tree > STP Status

The *STP Status* screen displays the STP status on the Switch. This information is read-only and cannot be modified.

Spanning Tree > STP Status

Spanning Tree State Indicates whether STP is enabled on the device.

Spanning Tree Mode The STP mode by which STP is enabled on the device.

Bridge ID The Bridge priority and MAC address.

Designated Root The ID of the bridge with the lowest path cost to the instance ID.

Root Port The port number that offers the lowest cost path from this bridge to the Root Bridge. It is significant when the Bridge is not the Root. The default is **0**.

Root Path Cost The cost of the path from this bridge to the root.

Root Maximum Age (sec) The device Maximum Age Time, which indicates the amount of time in seconds a bridge waits before sending configuration messages. The default is **20** seconds. The range is **6** to **40** seconds.

Root Hello Time (sec) The device Hello Time. The Hello Time indicates the amount of time in seconds a root bridge waits between configuration messages. The default is **2** seconds. The range is **1** to **10** seconds.

Root Forward delay (sec) The device forward delay time. The Forward Delay Time indicates the amount of time in seconds a bridge remains in a listening and learning state before forwarding packets. The default is **15** seconds. The range is **4** to **30** seconds.

Topology Changes Counts The total amount of STP state changes that have occurred.

Last Topology Change The elapsed time since the bridge was initialized or reset, and the last topographic change occurred. The time is displayed in a day hour minute second format, for example, 2 days 5 hours 10 minutes and 4 seconds.

Spanning Tree > Global STP

The *Global STP* screen contains global parameters for STP on the Switch.

Spanning Tree > Global STP

Global Setting

Spanning Tree State Select **Enable** or **Disable** from the drop-down menu to enable or disable STP on the Switch. The default is **Enable**.

BPDU Handling Determines how BPDU packets are managed when STP is disabled on the port or Switch. BPDUs are used to transmit spanning tree information. The possible values are:

- **Filtering** Filters BPDU packets when spanning tree is disabled on an interface. This is the default value.
- **Flooding** Floods BPDU packets when spanning tree is disabled on an interface.

Path Cost Default Values The method used to assign default path costs to STP ports. The possible values are:

- **Short** Specifies a range of 1-65,535 for port path costs. This is the default value.

Long Specifies a range of 1-200,000,000 for port path costs. The default path costs assigned to an interface varies according to the selected method.

Bridge Settings

Priority Specifies the bridge priority value. When switches or bridges are running STP, each is assigned a priority. After exchanging BPDUs, the device with the lowest priority value becomes the Root Bridge. The default value is **32768**. The value must be a multiple of 4096. For example, 4096, 8192, 12288, etc. The range is **0** to **65535**.

Hello Time Specifies the device Hello Time. The Hello Time indicates the amount of time in seconds a root bridge waits between configuration messages. The default is **2** seconds. The range is **1** to **10** seconds.

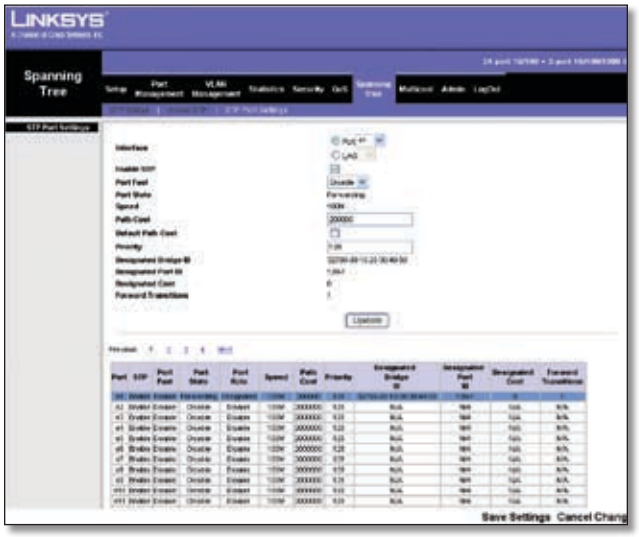
Max Age Specifies the device Maximum Age Time. The Maximum Age Time is the amount of time in seconds that a bridge waits before sending configuration messages. The default is **20** seconds. The range is **6** to **40** seconds.

Forward Delay Specifies the device forward delay time. The Forward Delay Time indicates the amount of time in seconds a bridge remains in a listening and learning state before forwarding packets. The default is 15 seconds. The range is **4** to **30** seconds.

Click **Save Settings** to save the changes, or **Cancel Changes** to cancel the changes.

Spanning Tree > STP Port Settings

The *STP Port Settings* screen allows network administrators to assign STP settings to specific interfaces.



Spanning Tree > STP Port Settings

Interface Indicates the port or LAG on which STP is enabled. Select either **Port** (default) or **LAG**, then select the interface from the drop-down menu.

Enable STP Select this to enable STP on the port. The default is Enabled.

Port Fast Indicates if Fast Link is enabled on the port. If Fast Link mode is enabled for a port, the Port State is automatically placed in the Forwarding state when the port link is up. Fast Link optimizes the STP protocol convergence. STP convergence can take 30-60 seconds in large networks. The possible values are **Enable**, **Auto**, and **Disable**. The default is **Disable**.

Port State Displays the current STP state of a port. If enabled, the port state determines what forwarding action is taken on traffic. Possible port states are:

- **Disabled** STP is currently disabled on the port. The port forwards traffic while learning MAC addresses.
- **Blocking** The port is currently blocked and cannot forward traffic or learn MAC addresses.
- **Listening** The port is in Listening mode. The port cannot forward traffic nor can it learn MAC addresses.
- **Learning** The port is in Learning mode. The port cannot forward traffic, but can learn new MAC addresses.
- **Forwarding** The port is in Forwarding mode. The port can forward traffic and learn new MAC addresses.

Speed Displays the speed at which the port is operating.

Path Cost Indicates the port contribution to the root path cost. The path cost is adjusted to a higher or lower value, and is used to forward traffic when a path being rerouted. The default value is **2000000** for a 10M port, **200000** for a 100M port, and **20000** for a 1G port or a LAG.

Default Path Cost When selected the default path cost is implemented. The default is unselected.

Priority Priority value of the port. This value influences the port choice when a bridge has two ports connected in a loop. The range of values is **0** -**240**. The default is **128**.

Designated Bridge ID Displays the bridge priority and the MAC Address of the designated bridge.

Designated Port ID Displays the selected port's priority and interface.

Designated Cost Displays the cost of the port participating in the STP topology. Ports with a lower cost are less likely to be blocked if STP detects loops.

Forward Transitions Displays the number of times the port has changed from the Blocking state to Forwarding state.

Click **Update** to update the screen with your changes.

Click **Save Settings** to save the changes, or **Cancel Changes** to cancel the changes.

Multicast

Multicast configuration options include IGMP Snooping, Bridge Multicast, and Bridge Multicast Forward All.

Multicast > IGMP Snooping

Multicast > IGMP Snooping

When IGMP Snooping is enabled globally, all IGMP packets are forwarded to the CPU. The CPU analyzes the incoming packets and determines:

- Which ports want to join which Multicast groups
- Which ports have Multicast routers generating IGMP queries
- Which routing protocols are forwarding packets and Multicast traffic

Ports requesting to join a specific Multicast group issue an IGMP report, specifying that Multicast group is accepting members. This results in the creation of the Multicast filtering database.

The *Bridge Multicast Forward All* screen contains two sections, IGMP Global and VLAN IGMP Settings. These sections and the fields they contain are described below.

IGMP Global

Enable IGMP Snooping Select this option to enable IGMP Snooping on the device. IGMP Snooping can be enabled only if Bridge Multicast Filtering is enabled. The default is **disabled** (option not selected).

VLAN IGMP Settings

VLAN ID Select the VLAN ID from the drop-down menu.

IGMP Status Select this option to enable IGMP snooping on the VLAN. Default is **disabled** (option not selected).

Auto Learn Select this option to enable Auto Learn on the device. If Auto Learn is enabled, the device automatically learns where other Multicast groups are located. The default is **enabled** (option is selected).

Host Timeout Indicates the amount of time host waits to receive a message before timing out. The default time is **260** seconds.

MRouter Timeout Indicates the amount of the time the Multicast router waits to receive a message before it times out. The default value is **300** seconds.

Leave Timeout Indicates the amount of time the host waits, after requesting to leave the IGMP group and not receiving a Join message from another station, before timing out. If a Leave Timeout occurs, the switch notifies the Multicast device to stop sending traffic The Leave Timeout value is either user-defined, or an immediate leave value. The default timeout is **10** seconds.

Click **Update** to update the screen with your changes.

Click **Save Settings** to save the changes, or **Cancel Changes** to cancel the changes.

Multicast > Bridge Multicast

The *Bridge Multicast* screen displays the ports and LAGs attached to the Multicast service group in the Ports and LAGs tables. The Port and LAG tables also reflect the manner in which the port or LAGs joined the Multicast group.

Multicast > Bridge Multicast

Ports can be added either to existing groups or to new Multicast service groups. The *Bridge Multicast* screen permits new Multicast service groups to be created. The Bridge Multicast screen also assigns ports to a specific Multicast service address group.

The *Bridge Multicast* screen contains the following fields:

VLAN ID Identifies a VLAN to be configured to a Multicast service.

Bridge Multicast Address Identifies the Multicast group MAC address/IP address.

Bridge IP Multicast Displays the port that can be added to a Multicast service.

Interface, Gigabit, LAG Lists switch interfaces and LAGs that can be added to a Multicast service. The configuration options are as follows:

- **Static** Indicates the port is user-defined.
- **Dynamic** Indicates the port is configured dynamically.
- **Forbidden** Forbidden ports are not included the Multicast group, even if IGMP snooping designated the port to join a Multicast group.
- **None** The port is not configured for Multicast service.

Click **Add to List** to add the configured static multicast address to the table at the bottom of the screen.

Click **Show All** to display all multicast addresses on all VLANs in the table at the bottom of the screen.

Click **Save Settings** to save the changes, or **Cancel Changes** to cancel the changes.

Multicast > Bridge Multicast Forward All

The *Bridge Multicast Forward All* screen contains fields for attaching ports or LAGs to a device that is attached to a neighboring Multicast router or switch.

Multicast > Bridge Multicast Forward All

Once IGMP Snooping is enabled, Multicast packets are forwarded to the appropriate port or VLAN.

The *Bridge Multicast Forward All* screen contains the following fields:

VLAN ID Displays the VLAN for which Multicast parameters are displayed.

Interface Interfaces with the following configuration options:

- **Static** The port is user-defined.
- **Dynamic** The port is configured dynamically.
- **None** The port is not configured for Multicast service.

Gigabit Gigabit ports with the following configuration options:

- **Static** The Gigabit port is user-defined.
- **Dynamic** The Gigabit port is configured dynamically.
- **None** The Gigabit port is not configured for Multicast service.

LAG LAGs with the following configuration options:

- **Static** The LAG is user-defined.
- **Dynamic** The LAG is configured dynamically.
- **None** The LAG is not configured for Multicast service.

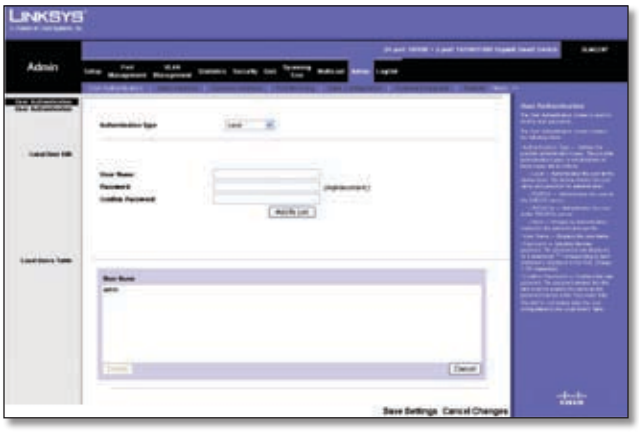
Click **Save Settings** to save the changes, or **Cancel Changes** to cancel the changes.

Admin

The Admin tab provides access to system administration settings and tools. It includes the following screens:

Admin > User Authentication

The *User Authentication* screen is used to modify user account information. You can modify the password or user name for an existing account, or create additional accounts.



Admin > User Authentication

User Authentication

Authentication Type Defines the user authentication methods. Combinations of all the authentication methods can be selected. The possible field values are:

- **Local** Authenticates the user at the device level. The device checks the user name and password for authentication.
- **RADIUS** Authenticates the user at the RADIUS server.
- **None** Assigns no authentication method to the authentication profile.

Local User Edit

User Name Displays the user name.

Password The password for the specified User Name. For security purposes, the password is not displayed; instead, a"*" is displayed for each character. The password must be between 1 and 159 characters in length.

Confirm Password Confirms the password when you change an existing password or create a new one (for a new User Name). The password entered into this field must be exactly the same as the password entered in the *Password* field.

Add to List/Update This button changes depending on the function you are performing. When you create a new user name it becomes **Add to List**; when you edit an existing password or user name, it becomes **Update**. For detailed information on its use, refer to the "Local Users Table" section below.

Local Users Table

The Local Users Table at the bottom of the screen lists all existing user names (for security purposes, passwords are not displayed). You use this table to edit or delete existing user names and/or passwords, as described below.

Create a new user name

Make sure no entry is selected in the Local Users Table. If one is selected, click **Cancel**. Enter the new user name in the *User Name* field, and the password in the *Password* and *Confirm Password* fields. Then click **Add to List** to add a new entry to the Local Users Table.

Change a password

Highlight the associated user name in the Local Users Table. The *User Name*, *Password*, and *Confirm Password* fields will then be populated for editing. Enter the new password in the *Password* field, then enter it again in the *Confirm Password* Field. Then click **Update** to save the changes to the Local Users Table.

Change a user name

Highlight the user name in the Local Users Table. The *User Name*, *Password*, and *Confirm Password* fields will then be populated for editing. Modify the user name in the *User Name* field, then click **Update** to update the entry in the Local Users Table.

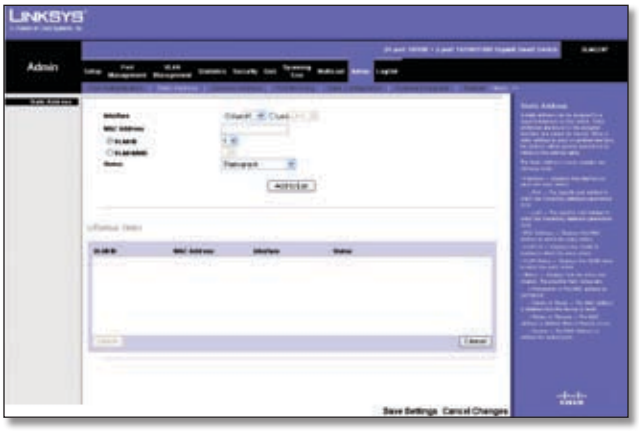
Delete a user name

Select the user name from the table, then click **Delete**.

If you accidentally select the wrong entry in the table, click **Cancel** to unselect the highlighted user name.

Click **Save Settings** to save the changes, or **Cancel Changes** to cancel the changes.

Admin > Static Address



Admin > Static Address

The *Static Address* screen lets you assign a static address to a specific interface on the Switch. A static address is bound to its assigned interface and cannot be moved. If a static address is seen on an interface to which it is not assigned, the address is ignored and is not written to the address table.

A list of all static addresses on the Switch is displayed at the bottom of the *Static Address* screen. The top section of the screen contains the following fields that you use to create static address entries.

Interface The interface that is associated with the static address. Select **Port** or **LAG**, then select the desired interface from the accompanying drop-down menu.

MAC Address This is the physical address that is being mapped to the specified interface.

VLAN ID The VLAN ID number (1-4093) of the configured VLAN that is associated with the specified interface. If you use this field the *VLAN Name* field is disabled.

VLAN Name The name of the VLAN associated with the specified interface. If you use this field, the *VLAN ID* field is disabled.

Status The static address type. The possible values are::

- **Permanent (default)** Keep the entry permanently.
- **Delete on Reset** Delete the entry when the Switch is reset.
- **Delete on Timeout** Delete the entry when a timeout occurs. The default timeout period is 300 seconds.
- **Secure** The entry is defined for locked ports.

After you have entered the information listed above, click **Add to List**. The static address will then appear in the list of static addresses. To delete a static MAC address from the list, select the entry in the list, then click **Remove**.

Admin > Dynamic Address

Admin > Dynamic Address

The Dynamic Address Table contains MAC addresses learned by monitoring the source address on inbound traffic. When the destination address of inbound traffic is found in the table, packets intended for that address are forwarded directly to the associated port. Otherwise, the traffic is flooded to all ports.

The *Dynamic Address* screen lets you query the table to find specific dynamic MAC addresses, or display MAC addresses associated with a specific interface or VLAN. Query criteria include interface type, MAC address, VLAN, and table sort key. You can also set the Dynamic MAC Address Table's address aging parameter or clear the table.

Address Aging Specifies the amount of time (in seconds) that a MAC address remains in the Dynamic MAC Address table before it times out, if no traffic from the source is detected. The default value is **300** seconds.

Clear Table If checked, this clears the MAC Address table.

Query

Interface Use this to query the table for a specific port or LAG. Select **Port** or **LAG** and select the interface from the drop-down menu.

MAC Address Use this to query the table for a specific MAC address. Enter the MAC address in the field.

VLAN ID Use this to query the table for a specific VLAN ID. Enter the VLAN ID in the field.

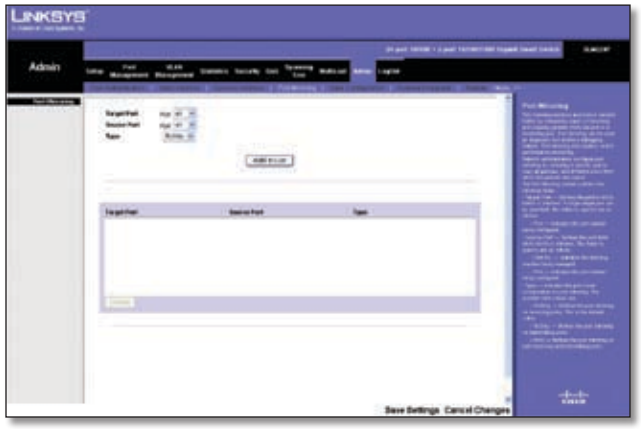
Address Table Sort Key Specifies how the search results will be sorted—by **Address**, **VLAN**, or **Interface**.

Specify the search criteria (Interface, MAC Address, or VLAN) and the sort method for the search results, then click **Query** to display the dynamic addresses matching the search criteria.

Admin > Port Mirroring

Port mirroring monitors and mirrors network traffic by forwarding copies of incoming and outgoing packets from one port to a monitoring port. Port mirroring can be used as diagnostic tool and/or a debugging feature. Port mirroring also enables switch performance monitoring.

Network administrators configure port mirroring by selecting a specific port to copy all packets, and different ports from which the packets are copied.



Admin > Port Mirroring

Set the following attributes for port mirroring using the *Port Mirroring* screen.

Target Port The port that will mirror the traffic on the source port.

Source Port The port whose traffic will be monitored.

Type Allows you to select which traffic to mirror to the target port; receive, transmit, or both.

- **RxOnly** Mirror only received traffic. This is the default value.
- **TxOnly** Mirror only transmitted traffic.
- **Both** Mirror both received and transmitted traffic.

Specify the source port, the traffic type to be mirrored, and the target port, then click **Add to List**. The mirror session is displayed in the text box.

Admin > Save Configuration

Admin > Save Configuration

The *Save Configuration* screen allows you to upload Switch configuration files to a TFTP server, or to download saved Switch configuration files from a TFTP server or from your computer via the HTTP interface.

Via TFTP Select this to upload to or download from a TFTP server. When you select this option, the following fields are displayed.

- **UPGRADE** Select this option to restore the Switch configuration from the file located on a TFTP server.
  - **TFTP Server** Enter the TFTP Server IP Address that contains the source file to download.
  - **File Name** Enter the name of the configuration file on the TFTP Server.
- **BACKUP** To back up the Switch configuration to a TFTP server, enter the TFTP server address.
  - **TFTP Server** Enter the TFTP Server IP Address to which the configuration file will be saved.
  - **File Name** Enter the name of the configuration file. The default is **StartupCfg.cfg**.

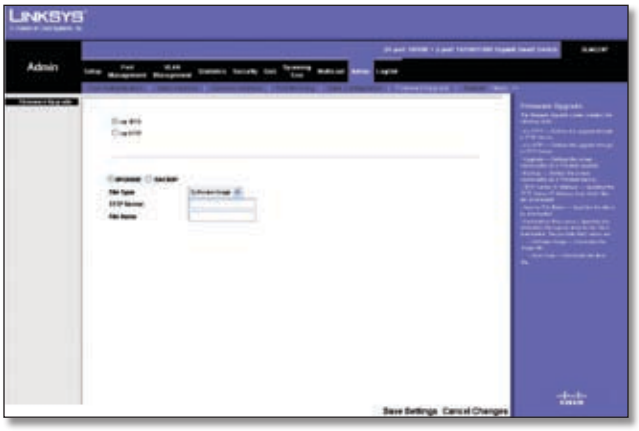
Via HTTP Select this to download a configuration file to the Switch from your computer using the HTTP interface. (HTTP only supports the upgrade operation. You cannot back up the configuration file using HTTP.) When you select this option, the following field is displayed.

- **Source File** Enter the name and path of the file or click **Browse** to locate the configuration file.

Click **Save Settings** to begin the download or upload.

After you have downloaded the configuration file to the Switch during an upgrade, the configuration file's settings will not take effect until the system is rebooted.

Admin > Firmware Upgrade



Admin > Firmware Upgrade

The *Firmware Upgrade* screen allows you to download firmware upgrade files from a TFTP server, or from your computer via the HTTP interface.

Via TFTP Select this to download from or upload to a TFTP server. When you select this option, the following fields are displayed.

- **UPGRADE** Select this option to upgrade the switch from a file located on a TFTP server.
  - **File Type** Select the type of file to download, either **Software Image** or **Boot Code**.
  - **TFTP Server** Enter the TFTP Server IP Address that contains the source file to upgrade from.
  - **File Name** Enter the name of the upgrade file on the TFTP Server.
- **BACKUP** To back up the firmware to a TFTP server, enter the TFTP server address.
  - **TFTP Server** Enter the TFTP Server IP Address to which the firmware file will be saved.
  - **File Name** Enter the name of the file.

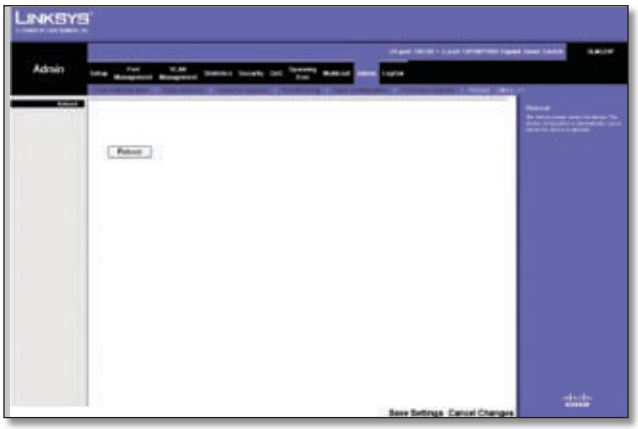
Via HTTP Select this to download an upgrade file using the HTTP interface. When you select this option, the following field is displayed:

- **Source File** Enter the name and path of the file or click **Browse** to locate the upgrade file.

Click **Save Settings** to begin the download or upload.

Admin > Reboot

The *Reboot* screen is used to reset the Switch. The current configuration settings are automatically saved before the Switch is rebooted.



Admin > Reboot

Click the **Reboot** button, then click **OK** to confirm.

Admin > Factory Default

The *Factory Default* screen allows network managers to reset the Switch to the factory defaults shipped with the switch. Restoring factory defaults results in erasing the configuration file.

NOTE: Restoring the factory defaults will erase all of your current configuration settings. Before you restore the factory defaults, you can save a backup of your current configuration settings from the Admin > Save Configuration screen..

Admin > Factory Default

Click **Reset Default**, then click **OK** to confirm and restart the Switch.

Admin > Logging

Admin > Logging

The System Logs allow you to view device events in real time, and recording the events for later usage. System Logs record and manage events and report errors or informational messages.

Event messages have a unique format, as per the SYSLOG protocols recommended message format for all error reporting. For example, Syslog and local device reporting messages are assigned a severity code, and include a message mnemonic, which identifies the source application generating the message. It allows messages to be filtered based on their urgency or relevancy. Each message severity determines the set of event logging devices that are sent per each event logging.

Enable Logging If this option is selected, device global logs for Cache, File, and Server Logs are enabled. The default is enabled.

- **Emergency** The system is not functioning.
- **Alert** The system needs immediate attention.
- **Critical** The system is in a critical state.
- **Error** A system error has occurred.
- **Warning** A system warning has occurred.
- **Notice** The system is functioning properly, but system notice has occurred.
- **Informational** Provides device information.
- **Debug** Provides detailed information about the log. If a Debug error occurs, contact Customer Tech Support.

If you enable Logging, use the checkboxes to set the level of event messages to be logged to RAM (Memory Logs) and flash memory (Flash Logs), then click **Save Settings**.

Admin > Memory Logs

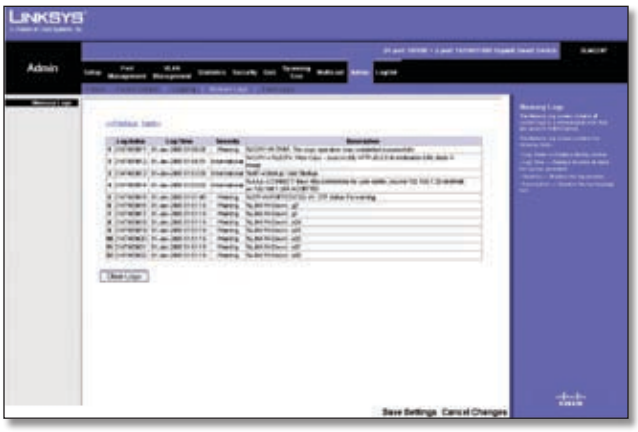
The *Memory Log* screen contains all system logs in chronological order that are saved in RAM (Cache).

Log Index Displays the log number.

Log Time Displays the date and time at which the log was generated.

Severity Displays the log severity.

Description Displays the log message text.



Admin > Memory Logs

Admin > Flash Logs

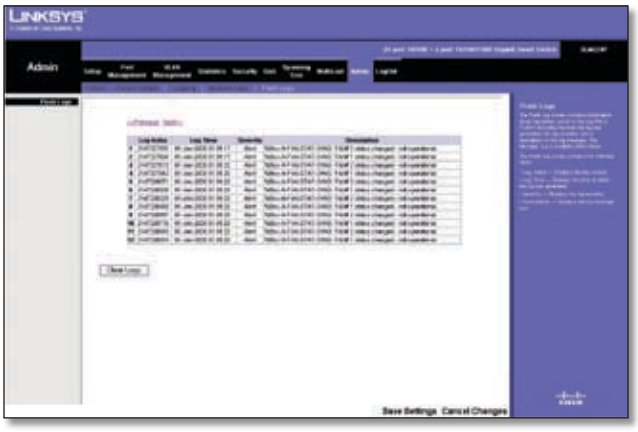
The *Flash Log* screen contains information about log entries saved to the Log File in flash memory, including the time the log was generated, the log severity, and a description of the log message. The Message Log is available after reboot.

Log Index Displays the log number.

Log Time Displays the date and time at which the log was generated.

Severity Displays the log severity.

Description Displays the log message text.



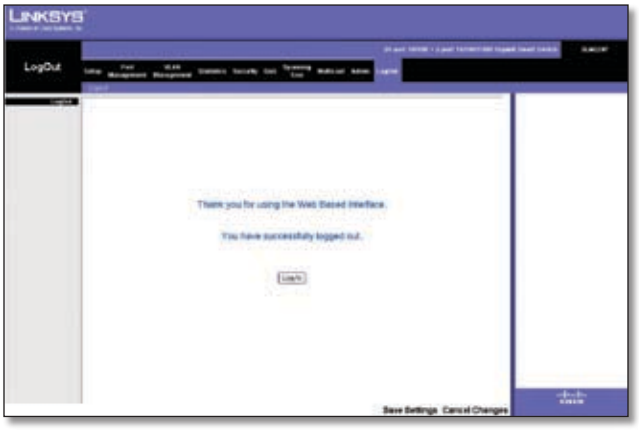
Admin > Flash Logs

Logout

The Logout tab is used to terminate the login session. When you select the Logout tab, the following dialog box asks you to verify if you want to log out.

Logout Verification

If you select **Yes**, a confirmation screen appears.



Confirmation of Successful Logout

Appendix A: About Gigabit Ethernet and Fiber Optic Cabling

Gigabit Ethernet

Gigabit Ethernet runs at speeds of 1Gbps (Gigabit per second), ten times faster than 100Mbps Fast Ethernet, but it still integrates seamlessly with 100Mbps Fast Ethernet hardware. Users can connect Gigabit Ethernet hardware with either fiber optic cabling or copper Category 5e cabling, with fiber optics more suited for network backbones. As the Gigabit standard gradually integrates into existing networks, current computer applications will enjoy faster access time for network data, hardware, and Internet connections.

Fiber Optic Cabling

Fiber optic cabling is made from flexible, optically efficient strands of glass and coated with a layer of rubber tubing, fiber optics use photons of light instead of electrons to send and receive data. Although fiber is physically capable of carrying terabits of data per second, the signaling hardware currently on the market can handle no more than a few gigabits of data per second.

Fiber cables come with two main connector types. The most commonly used fiber optic cable is multi-mode fiber cable (MMF), with a 62,5 micron fiber optic core. Single-mode fiber cabling is somewhat more efficient than multi-mode but far more expensive, due to its smaller optic core that helps retain the intensity of traveling light signals. A fiber connection always require two fiber cables: one transmits data, and the other receives it.

Each fiber optic cable is tipped with a connector that fits into a fiber port on a network adapter, hub, or switch. In the USA, most cables use a square SC connector that slides and locks into place when plugged into a port or connected to another cable. In Europe, the round ST connector is more prevalent.

For Gigabit Ethernet, you must use the Linksys MGBT1, MGBSX1, or MGBLH1 miniGBIC modules with the Linksys Gigabit Switches. The MGBSX1 and the MGBLH1 require fiber cabling with LC connectors, and the MGBT1 requires a Category 5e Ethernet cable with an RJ-45 connector.

For Fast Ethernet, you must use the MFEFX1 (100BASE-FX) or MFELX1 (100BASE-LX) SFP transceivers.

Appendix B: Glossary

This glossary contains some basic networking terms you may come across when using this product.

WEB: For additional terms, please visit the glossary at **www.linksys.com/glossary**

Access Mode Specifies the method by which user access is granted to the system.

Access Point A device that allows wireless-equipped computers and other devices to communicate with a wired network. Also used to expand the range of a wireless network.

Access Profiles Allows network managers to define profiles and rules for accessing the device. Access to management functions can be limited to user groups, which are defined by the following criteria:

- Ingress interfaces
- Source IP address and/or Source IP subnets.

ACE Filters in Access Control Lists (ACL) that determine which network traffic is forwarded. An ACE is based on the following criteria:

- Protocol
- Protocol ID
- Source Port
- Destination Port
- Wildcard Mask
- Source IP Address
- Destination IP Address

ACL (Access Control List) Access Control Lists are used to grant, deny, or limit access devices, features, or applications.

Auto-negotiation Allows 10/100 Mbps or 10/100/1000 Mbps Ethernet ports to automatically establish the optimal duplex mode, flow control, and speed.

Back Pressure A mechanism used with Half Duplex mode that enables a port not to receive a message.

Bandwidth The transmission capacity of a given device or network.

Bandwidth Assignments Indicates the amount of bandwidth assigned to a specific application, user, and/or interface.

Baud Indicates the number of signaling elements transmitted each second.

Best Effort Indicates that traffic is assigned to the lowest priority queue, and packet delivery is not guaranteed.

Bit A binary digit.

Boot To start a device and cause it to start executing instructions.

Browser An application program that provides a way to look at and interact with all the information on the World Wide Web.

Bridge A device that connect two networks. Bridges are hardware specific, however they are protocol independent. Bridges operate at Layer 1 and Layer 2 levels.

Broadcast Domain Devices sets that receive broadcast frames originating from any device within a designated set. Routers bind Broadcast domains, because routers do not forward broadcast frames.

Broadcast Storm An excessive amount of broadcast messages simultaneously transmitted across a network by a single port. Forwarded message responses are heaped onto the network, overloading network resources or causing the network to time out.

Burst A packet transmission at faster than normal rates. Bursts are limited in time and only occur under specific conditions.

Burst Size Indicates the burst size transmitted at a faster than normal rate.

Byte A unit of data that is usually eight bits long

Cable Modem A device that connects a computer to the cable television network, which in turn connects to the Internet.

CBS (Committed Burst Size) Indicates the maximum number of data bits transmitted within a specific time interval.

CIR (Committed Information Rate) The data rate is averaged over a minimum time increment.

Class Maps An aspect of Quality of Service system that is comprised of an IP ACL and/or a MAC ACL. Class maps are configured to match packet criteria, and are matched to packets in a first-fit fashion.

Combo Ports A single logical port with two physical connections, including an RJ-45 connection and a SFP connection.

Communities Specifies a group of users which retain the same system access rights.

CoS (Class of Service) The 802.1p priority scheme. CoS provides a method for tagging packets with priority information. A CoS value between 0-7 is added to the Layer II header of packets, where zero is the lowest priority and seven is the highest.

DDNS (Dynamic Domain Name System) Allows the hosting of a website, FTP server, or e-mail server with a fixed domain name (e.g., www.xyz.com) and a dynamic IP address.

Default Gateway A device that forwards Internet traffic from your local area network.

DHCP (Dynamic Host Configuration Protocol) A networking protocol that allows administrators to assign temporary IP addresses to network computers by "leasing" an IP address to a user for a limited amount of time, instead of assigning permanent IP addresses.

DHCP Clients An Internet host using DHCP to obtain configuration parameters, such as a network address.

DHCP Server An Internet host that returns configuration parameters to DHCP clients.

DNS (Domain Name Server) The IP address of your ISP's server, which translates the names of websites into IP addresses.

Domain A specific name for a network of computers.

Download To receive a file transmitted over a network.

DSL (Digital Subscriber Line) An always-on broadband connection over traditional phone lines.

DSCP (DiffServ Code Point) Provides a method of tagging IP packets with QoS priority information.

Dynamic IP Address A temporary IP address assigned by a DHCP server.

EIGRP (Enhanced Interior Gateway Routing Protocol) Provides fast convergence, support for variable-length subnet mask, and supports multiple network layer protocols.

Encryption Encoding data transmitted in a network.

Ethernet IEEE standard network protocol that specifies how data is placed on and retrieved from a common transmission medium.

Firmware The programming code that runs a networking device.

Flow Control Enables lower speed devices to communicate with higher speed devices. This is implemented by the higher speed device refraining from sending packets.

FTP (File Transfer Protocol) A protocol used to transfer files over a TCP/IP network.

Full Duplex The ability of a networking device to receive and transmit data simultaneously.

GARP (General Attributes Registration Protocol) Registers client stations into a multicast domain.

Gateway A device that interconnects networks with different, incompatible communications protocols.

GBIC (GigaBit Interface Converter) A hardware module used to attach network devices to fiber-based transmission systems. GBIC converts the serial electrical signals to serial optical signals and vice versa.

GVRP (GARP VLAN Registration Protocol) Registers client stations into a VLANs.

Half Duplex Data transmission that can occur in two directions over a single line, but only one direction at a time.

HTTP (HyperText Transport Protocol) The communications protocol used to connect to servers on the World Wide Web.

HTTPS (HyperText Transport Protocol Secure) An extension to the standard HTTP protocol that provides confidentiality by encrypting the traffic from the website. By default this protocol uses TCP port 443.

ICMP (Internet Control Message Protocol) Allows the gateway or destination host to communicate with the source host. For example, to report a processing error.

IGMP (Internet Group Management Protocol) Allows hosts to notify their local switch or router that they want to receive transmissions assigned to a specific multicast group.

IP (Internet Protocol) A protocol used to send data over a network.

IP Address The address used to identify a computer or device on a network.

IPCONFIG A Windows 2000 and XP utility that displays the IP address for a particular networking device.

IPSec (Internet Protocol Security) A VPN protocol used to implement secure exchange of packets at the IP layer.

ISP (Internet Service Provider) A company that provides access to the Internet.

Jumbo Frames Enable transporting identical data in fewer frames. Jumbo Frames reduce overhead, lower processing time, and ensure fewer interrupts.

LAG (Link Aggregated Group) Aggregates ports or VLANs into a single virtual port or VLAN.

LAN The computers and networking products that make up your local network.

MAC (Media Access Control) Address The unique address that a manufacturer assigns to each networking device.

Mask A filter that includes or excludes certain values, for example parts of an IP address.

Mbps (MegaBits Per Second) One million bits per second; a unit of measurement for data transmission.

MD5 (Message Digest 5) An algorithm that produces a 128-bit hash. MD5 is a variation of MD4, and increases MD4 security. MD5 verifies the integrity of the communication and authenticates the origin of the communication.

MDI (Media Dependent Interface) A cable used for end stations.

MDIX (Media Dependent Interface with Crossover) A cable used for hubs and switches.

MIB (Management Information Base) MIBs contain information describing specific aspects of network components.

Multicast Transmits copies of a single packet to multiple ports.

Network A series of computers or devices connected for the purpose of data sharing, storage, and/or transmission between users.

NMS (Network Management System) An interface that provides a method of managing a system.

OID (Object Identifier) Used by SNMP to identify managed objects. In the SNMP Manager/Agent network management paradigm, each managed object must have an OID to identify it.

Packet A unit of data sent over a network.

Ping (Packet INternet Groper) An Internet utility used to determine whether a particular IP address is online.

Policing Determines if traffic levels are within a specified profile. Policing manages the maximum traffic rate used to send or receive packets on an interface.

Port The connection point on a computer or networking device used for plugging in cables or adapters.

Port Mirroring Monitors and mirrors network traffic by forwarding copies of incoming and outgoing packets from one port to a monitoring port.

Power over Ethernet (PoE) A technology enabling an Ethernet network cable to deliver both data and power.

QoS (Quality of Service) Provides policies that contain sets of filters (rules). QoS allows network managers to decide how and what network traffic is forwarded according to priorities, application types, and source and destination addresses.

RADIUS (Remote Authentication Dial-In User Service) A protocol that uses an authentication server to control network access.

RJ-45 (Registered Jack-45) An Ethernet connector that holds up to eight wires.

RMON (Remote Monitoring) Provides network information to be collected from a single workstation.

Router A networking device that connects multiple networks together.

RSTP (Rapid Spanning Tree Protocol) Detects and uses network topologies that allow a faster convergence of the spanning tree, without creating forwarding loops.

Server Any computer whose function in a network is to provide user access to files, printing, communications, and other services.

SMTP (Simple Mail Transfer Protocol) The standard e-mail protocol on the Internet.

SNMP (Simple Network Management Protocol) A widely used network monitoring and control protocol.

SSH Secure Shell. A utility that uses strong authentication and secure communications to log in to another computer over a network.

SSL (Secure Socket Layer) Encryption technology for the Internet used to provide secure transactions, such as the transmission of credit card numbers for e-commerce.

Static IP Address A fixed address assigned to a computer or device that is connected to a network.

STP (Spanning Tree Protocol) Prevents loops in network traffic. The Spanning Tree Protocol (STP) provides tree topography for any arrangement of bridges. STP provides one path between end stations on a network, eliminating loops.

Subnet (Sub-network) Subnets are portions of a network that share a common address component. In TCP/IP networks, devices that share a prefix are part of the same subnet. For example, all devices with a prefix of 157.100.100.100 are part of the same subnet.

Subnet Mask An address code that determines the size of the network.

Switch Filters and forwards packets between LAN segments. Switches support any packet protocol type.

TACACS+ (Terminal Access Controller Access Control System Plus) Proprietary Cisco enhancement to Terminal Access Controller Access Control System (TACACS). Provides additional support for authentication, authorization, and accounting.

TCP (Transmission Control Protocol) A network protocol for transmitting data that requires acknowledgement from the recipient of data sent.

TCP/IP (Transmission Control Protocol/Internet Protocol) A set of instructions PCs use to communicate over a network.

Telnet A user command and TCP/IP protocol used for accessing remote PCs.

TFTP (Trivial File Transfer Protocol) A version of the TCP/IP FTP protocol that has no directory or password capability.

Throughput The amount of data moved successfully from one node to another in a given time period.

Trunking Link Aggregation. Optimizes port usage by linking a group of ports together to form a single trunk (aggregated groups).

TX Rate Transmission Rate.

UDP (User Data Protocol) Communication protocol that transmits packets but does not guarantee their delivery.

Upgrade To replace existing software or firmware with a newer version.

Upload To transmit a file over a network.

URL (Uniform Resource Locator) The address of a file located on the Internet.

VLAN (Virtual Local Area Networks) Logical subgroups that constitute a Local Area Network (LAN). This is done in software rather than defining a hardware solution.

WAN (Wide Area Network) Networks that cover a large geographical area.

Wildcard Mask Specifies which IP address bits are used, and which bits are ignored. A wild card mask of 255.255.255.255 indicates that no bit is important. A wildcard of 0.0.0.0 indicates that all the bits are important.

For example, if the destination IP address is 149.36.184.198 and the wildcard mask is 255.36.184.00, the first two bits of the IP address are used, while the last two bits are ignored.

Appendix C: Specifications

SLM2024/SLM2048

Specifications

Ports	24 or 48 RJ-45 connectors for 10BASE-T/100BASE-TX/1000BASE-T including 2 combo ports with miniGBIC/SFP slots Auto MDI/MDI-X Auto-negotiate/Manual setting
Buttons	Reset
Cabling Type	UTP CAT 5e or better for 1000BASE-T
LEDs	System, Gigabit Link/Act and Speed

Performance

Switching Capacity	**SLM2024:** 48 Gbps non-blocking **SLM2048:** 96 Gbps non-blocking
Forwarding Rate	**SLM2024:** 35,71 Mpps wire-speed performance **SLM2048:** 71,42 Mpps wire-speed performance

Layer 2

MAC Table Size	8K
Number of VLANs	128 active VLANs (4096 range)
VLAN	Port-based and 802.1Q Tag-based VLANs Management VLAN
HOL Blocking	Head of line blocking prevention

Management

Web User Interface	Built-in Web UI for easy browser-based configuration (HTTP)
Firmware Upgrade	Web Browser upgrade (HTTP) and TFTP upgrade
Port Mirroring	Traffic on a port can be mirrored to another port for analysis with a network analyzer
Other Management	DHCP/BootP Client System Log Configuration upload and backup via HTTP or TFTP

Security

802.1X - RADIUS Authentication.
MD5 Encryption
Port Security - MAC-based Filtering
Management Access Control

Availability

Link Aggregation	Link Aggregation using IEEE 802.3ad LACP Up to 4 groups with up to 8 ports per group
Storm Control	Broadcast and Multicast
Spanning Tree	IEEE 802.1D Spanning Tree and Port Fast
IGMP Snooping	IGMP (v1/v2) Snooping provides for fast client joins and leaves of multicast streams and limits bandwidth-intensive video traffic to only the requestors. Supports 32 Multicast Groups

QoS

Priority levels	4 Hardware queues
Scheduling	Priority Queueing and Weighted Round Robin (WRR)
Class of Service	Port-based 802.1p VLAN priority-based IPv4/v6 IP DSCP based

Standards

802.3 10BASE-T Ethernet,
802.3u 100BASE-TX Fast Ethernet,
802.3ab 1000BASE-T Gigabit Ethernet,
802.3z Gigabit Ethernet,
802.3x Flow Control,
802.3ad LACP,
802.1D STP,
802.1Q/p VLAN,
802.1X Port Access Authentication

Environmental

Dimensions (W x H x D)	**SLM2024:** 440 x 43 x 257 mm **SLM2048:** 440 x 43 x 345 mm
Unit Weight	**SLM2024**: 3,1 kg **SLM2048**: 4,6 kg
Power	Internal Power, 100-240V
Certification	FCC Part15 Class A, CE Class A, UL, cUL, CE mark, CB

Operating Temp.	0 to 50ºC
Storage Temp.	0 to 70ºC
Operating Humidity	10 to 90% Noncondensing
Storage Humidity	10 to 90% Noncondensing

SLM224G/SLM248G/SLM224P/SLM248P

Specifications

Ports	24 or 48 RJ-45 connectors for 10BASE-T/100BASE-TX, 2 combo ports with RJ-45 connectors for 10BASE-T/ 100BASE-TX/1000BASE-T and miniGBIC/SFP slots Auto MDI/MDI-X Auto-negotiate/Manual setting
Buttons	Reset
Cabling Type	UTP CAT 5 or better for 10BASE-T/100BASE-TX, UTP CAT 5e or better for 1000BASE-T
LEDs	**SLM224G and SLM248G:** System 10/100 Link/Act and Speed Gigabit Link/Act and Speed **SLM224P and SLM248P:** System 10/100 Link/Act and PoE or Speed Gigabit Link/Act and Speed

Performance

Switching Capacity	**SLM224G and SLM224P:** 8,8 Gbps non-blocking **SLM248G and SLM248P:** 13,6 Gbps non-blocking
Forwarding Rate	**SLM224G and SLM224P:** 6,55 Mpps wire-speed performance **SLM248G and SLM248P:** 10,12 Mpps wire-speed performance

Layer 2

MAC Table Size	8K
Number of VLANs	128 active VLANs (4096 range)
VLAN	Port-based and 802.1Q Tag-based VLANs Management VLAN
HOL Blocking	Head of line blocking prevention

Management

Web User Interface	Built-in Web UI for easy browser-based configuration (HTTP)
Firmware Upgrade	Web Browser upgrade (HTTP) and TFTP upgrade
Port Mirroring	Traffic on a port can be mirrored to another port for analysis with a network analyzer
Other Management	DHCP/BootP Client System Log Configuration upload and backup via HTTP or TFTP

Security

	802.1X - RADIUS Authentication. MD5 Encryption Port Security - MAC-based Filtering Management Access Control

Availability

Link Aggregation	Link Aggregation using IEEE 802.3ad LACP Up to 4 groups with up to 8 ports per group
Storm Control	Broadcast and Multicast
Spanning Tree	IEEE 802.1D Spanning Tree and Port Fast
IGMP Snooping	IGMP (v1/v2) Snooping provides for fast client joins and leaves of multicast streams and limits bandwidth-intensive video traffic to only the requestors. Supports 32 Multicast Groups

QoS

Priority levels	4 Hardware queues
Scheduling	Priority Queueing and Weighted Round Robin (WRR)
Class of Service	Port-based 802.1p VLAN priority-based IPv4/v6 IP DSCP based

Standards

	802.3 10BASE-T Ethernet, 802.3u 100BASE-TX Fast Ethernet, 802.3ab 1000BASE-T Gigabit Ethernet, 802.3z Gigabit Ethernet, 802.3x Flow Control, 802.3ad LACP, 802.1D STP, 802.1Q/p VLAN, 802.1X Port Access Authentication

Environmental

Dimensions (W x H x D)	**SLM224G, SLM224P, SLM248G:** 440 x 43 x 257 mm **SLM248G:** 440 x 43 x 345 mm
Unit Weight	**SLM224G:** 2,9 kg **SLM248G:** 3,1 kg

	SLM224P: 3,3 kg **SLM248P:** 4,6 kg
Power	Internal Power, 100-240V
Certification	FCC Part15 Class A, CE Class A, UL, cUL, CE mark, CB
Operating Temp.	0 to 50ºC
Storage Temp.	0 to 70ºC
Operating Humidity	10 to 90% Noncondensing
Storage Humidity	10 to 90% Noncondensing

Appendix D: Warranty Information

Linksys warrants to You that, for a period of five years (the "Warranty Period"), your Linksys Product will be substantially free of defects in materials and workmanship under normal use. Your exclusive remedy and Linksys' entire liability under this warranty will be for Linksys at its option to repair or replace the Product or refund Your purchase price less any rebates. This limited warranty extends only to the original purchaser.

If the Product proves defective during the Warranty Period call Linksys Technical Support in order to obtain a Return Authorization Number, if applicable. BE SURE TO HAVE YOUR PROOF OF PURCHASE ON HAND WHEN CALLING. If You are requested to return the Product, mark the Return Authorization Number clearly on the outside of the package and include a copy of your original proof of purchase. RETURN REQUESTS CANNOT BE PROCESSED WITHOUT PROOF OF PURCHASE. You are responsible for shipping defective Products to Linksys. Linksys pays for UPS Ground shipping from Linksys back to You only. Customers located outside of the United States of America and Canada are responsible for all shipping and handling charges.

ALL IMPLIED WARRANTIES AND CONDITIONS OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED TO THE DURATION OF THE WARRANTY PERIOD. ALL OTHER EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS AND WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF NON-INFRINGEMENT, ARE DISCLAIMED. Some jurisdictions do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to You. This warranty gives You specific legal rights, and You may also have other rights which vary by jurisdiction.

This warranty does not apply if the Product (a) has been altered, except by Linksys, (b) has not been installed, operated, repaired, or maintained in accordance with instructions supplied by Linksys, or (c) has been subjected to abnormal physical or electrical stress, misuse, negligence, or accident. In addition, due to the continual development of new techniques for intruding upon and attacking networks, Linksys does not warrant that the Product will be free of vulnerability to intrusion or attack.

TO THE EXTENT NOT PROHIBITED BY LAW, IN NO EVENT WILL LINKSYS BE LIABLE FOR ANY LOST DATA, REVENUE OR PROFIT, OR FOR SPECIAL, INDIRECT, CONSEQUENTIAL, INCIDENTAL OR PUNITIVE DAMAGES, REGARDLESS OF THE THEORY OF LIABILITY (INCLUDING NEGLIGENCE), ARISING OUT OF OR RELATED TO THE USE OF OR INABILITY TO USE THE PRODUCT (INCLUDING ANY SOFTWARE), EVEN IF LINKSYS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT WILL LINKSYS' LIABILITY EXCEED THE AMOUNT PAID BY YOU FOR THE PRODUCT. The foregoing limitations will apply even if any warranty or remedy provided under this Agreement fails of its essential purpose. Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to You.

This Warranty is valid and may be processed only in the country of purchase.

Please direct all inquiries to: Linksys, P.O. Box 18558, Irvine, CA 92623.

Appendix E: Regulatory Information

FCC Statement

This equipment has been tested and complies with the specifications for a Class A digital device, pursuant to Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. These limits are designed to provide reasonable protection against harmful interference when equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

WARNING: You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

Safety Notices

- Caution: To reduce the risk of fire, use only No.26 AWG or larger telecommunication line cord.
- Do not use this product near water, for example, in a wet basement or near a swimming pool.
- Avoid using this product during an electrical storm. There may be a remote risk of electric shock from lightning.

Industry Canada Statement

This Class A digital apparatus complies with Canadian ICES-003.

Operation is subject to the following two conditions:

1. This device may not cause interference and
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Avis d' Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 d' Industrie Canada.

Le fonctionnement est soumis aux conditions suivantes :

1. Ce périphérique ne doit pas causer d'interférences;
2. Ce périphérique doit accepter toutes les interférences reçues, y compris celles qui risquent d'entraîner un fonctionnement indésirable.

EC Declaration of Conformity (Europe)

In compliance with the EMC Directive 89/336/EEC, Low Voltage Directive 73/23/EEC, and Amendment Directive 93/68/EEC, this product meets the requirements of the following standards:

- EN55022 Emission
- EN55024 Immunity
- EN60950 Safety

User Information for Consumer Products Covered by EU Directive 2002/96/EC on Waste Electric and Electronic Equipment (WEEE)

This document contains important information for users with regards to the proper disposal and recycling of Linksys products. Consumers are required to comply with this notice for all electronic products bearing the following symbol:

English - Environmental Information for Customers in the European Union

European Directive 2002/96/EC requires that the equipment bearing this symbol on the product and/or its packaging must not be disposed of with unsorted municipal waste. The symbol indicates that this product should be disposed of separately from regular household waste streams. It is your responsibility to dispose of this and other electric and electronic equipment via designated collection facilities appointed by the government or local authorities. Correct disposal and recycling will help prevent potential negative consequences to the environment and human health. For more detailed information about the disposal of your old equipment, please contact your local authorities, waste disposal service, or the shop where you purchased the product.

Български (Bulgarian) - Информация относно опазването на околната среда за потребители в Европейския съюз

Европейска директива 2002/96/ЕС изисква уредите, носещи този символ върху изделието и/или опаковката му, да не се изхвърля т с несортирани битови отпадъци. Символът обозначава, че изделието трябва да се изхвърля отделно от сметосъбирането на обикновените битови отпадъци. Ваша е отговорността този и другите електрически и електронни уреди да се изхвърлят в предварително определени от държавните или общински органи специализирани пунктове за събиране. Правилното изхвърляне и рециклиране ще спомогнат да се предотвратят евентуални вредни за околната среда и здравето на населението последствия. За по-подробна информация относно изхвърлянето на вашите стари уреди се обърнете към местните власти, службите за сметосъбиране или магазина, от който сте закупили уреда.

Ceština (Czech) - Informace o ochraně životního prostředí pro zákazníky v zemích Evropské unie

Evropská směrnice 2002/96/ES zakazuje, aby zařízení označené tímto symbolem na produktu anebo na obalu bylo likvidováno s netříděným komunálním odpadem. Tento symbol udává, že daný produkt musí být likvidován odděleně od běžného komunálního odpadu. Odpovídáte za likvidaci tohoto produktu a dalších elektrických a elektronických zařízení prostřednictvím určených sběrných míst stanovených vládou nebo místními úřady. Správná likvidace a recyklace pomáhá předcházet potenciálním negativním dopadům na životní prostředí a lidské zdraví. Podrobnější informace o likvidaci starého vybavení si laskavě vyžádejte od místních úřadů, podniku zabývajícího se likvidací komunálních odpadů nebo obchodu, kde jste produkt zakoupili.

Dansk (Danish) - Miljøinformation for kunder i EU

EU-direktiv 2002/96/EF kræver, at udstyr der bærer dette symbol på produktet og/eller emballagen ikke må bortskaffes som usorteret kommunalt affald. Symbolet betyder, at dette produkt skal bortskaffes adskilt fra det almindelige husholdningsaffald. Det er dit ansvar at bortskaffe dette og andet elektrisk og elektronisk udstyr via bestemte indsamlingssteder udpeget af staten eller de lokale myndigheder. Korrekt bortskaffelse og genvinding vil hjælpe med til at undgå mulige skader for miljøet og menneskers sundhed. Kontakt venligst de lokale myndigheder, renovationstjenesten eller den butik, hvor du har købt produktet, angående mere detaljeret information om bortskaffelse af dit gamle udstyr.

Deutsch (German) - Umweltinformation für Kunden innerhalb der Europäischen Union

Die Europäische Richtlinie 2002/96/EC verlangt, dass technische Ausrüstung, die direkt am Gerät und/oder an der Verpackung mit diesem Symbol versehen ist, nicht zusammen mit unsortiertem Gemeindeabfall entsorgt werden darf. Das Symbol weist darauf hin, dass das Produkt von regulärem Haushaltmüll getrennt entsorgt werden sollte. Es liegt in Ihrer Verantwortung, dieses Gerät und andere elektrische und elektronische Geräte über die dafür zuständigen und von der Regierung oder örtlichen Behörden dazu bestimmten Sammelstellen zu entsorgen. Ordnungsgemäßes Entsorgen und Recyceln trägt dazu bei, potentielle negative Folgen für Umwelt und die menschliche Gesundheit zu vermeiden. Wenn Sie weitere Informationen zur Entsorgung Ihrer Altgeräte benötigen, wenden Sie sich bitte an die örtlichen Behörden oder städtischen Entsorgungsdienste oder an den Händler, bei dem Sie das Produkt erworben haben.

Eesti (Estonian) - Keskkonnaalane informatsioon Euroopa Liidus asuvatele klientidele

Euroopa Liidu direktiivi 2002/96/EÜ nõuete kohaselt on seadmeid, millel on tootel või pakendil käesolev sümbol, keelatud kõrvaldada koos sorteerimata olmejäätmetega. See sümbol näitab, et toode tuleks kõrvaldada eraldi tavalistest olmejäätmevoogudest. Olete kohustatud kõrvaldama käesoleva ja ka muud elektri- ja elektroonikaseadmed riigi või kohalike ametiasutuste poolt ette nähtud kogumispunktide kaudu. Seadmete korrektne kõrvaldamine ja ringlussevõtt aitab vältida võimalikke negatiivseid tagajärgi keskkonnale ning inimeste tervisele. Vanade seadmete kõrvaldamise kohta täpsema informatsiooni saamiseks võtke palun ühendust kohalike ametiasutustega, jäätmekäitlusfirmaga või kauplusega, kust te toote ostsite.

Español (Spanish) - Información medioambiental para clientes de la Unión Europea

La Directiva 2002/96/CE de la UE exige que los equipos que lleven este símbolo en el propio aparato y/o en su embalaje no deben eliminarse junto con otros residuos urbanos no seleccionados. El símbolo indica que el producto en cuestión debe separarse de los residuos domésticos convencionales con vistas a su eliminación. Es responsabilidad suya desechar este y cualesquiera otros aparatos eléctricos y electrónicos a través de los puntos de recogida que ponen a su disposición el gobierno y las autoridades locales. Al desechar y reciclar correctamente estos aparatos estará contribuyendo a evitar posibles consecuencias negativas para el medio ambiente y la salud de las personas. Si desea obtener información más detallada sobre la eliminación segura de su aparato usado, consulte a las autoridades locales, al servicio de recogida y eliminación de residuos de su zona o pregunte en la tienda donde adquirió el producto.

ξλληνικά (Greek) - Στοιχεία περιβαλλοντικής προστασίας για πελάτες εντός της Ευρωπαϊκής Ένωσης

Η Κοινοτική Οδηγία 2002/96/EC απαιτεί ότι ο εξοπλισμός ο οποίος φέρει αυτό το σύμβολο στο προϊόν και/ή στη συσκευασία του δεν πρέπει να απορρίπτεται μαζί με τα μικτά κοινοτικά απορρίμματα. Το σύμβολο υποδεικνύει ότι αυτό το προϊόν θα πρέπει να απορρίπτεται ξεχωριστά από τα συνήθη οικιακά απορρίμματα. Είστε υπεύθυνος για την απόρριψη του παρόντος και άλλου ηλεκτρικού και ηλεκτρονικού εξοπλισμού μέσω των καθορισμένων εγκαταστάσεων συγκέντρωσης απορριμμάτων οι οποίες παρέχονται από το κράτος ή τις αρμόδιες τοπικές αρχές. Η σωστή απόρριψη και ανακύκλωση συμβάλλει στην πρόληψη πιθανών αρνητικών συνεπειών για το περιβάλλον και την υγεία. Για περισσότερες πληροφορίες σχετικά με την απόρριψη του παλιού σας εξοπλισμού, παρακαλώ επικοινωνήστε με τις τοπικές αρχές, τις υπηρεσίες απόρριψης ή το κατάστημα από το οποίο αγοράσατε το προϊόν.

Français (French) - Informations environnementales pour les clients de l'Union européenne

La directive européenne 2002/96/CE exige que l'équipement sur lequel est apposé ce symbole sur le produit et/ou son emballage ne soit pas jeté avec les autres ordures ménagères. Ce symbole indique que le produit doit être éliminé dans un circuit distinct de celui pour les déchets des ménages. Il est de votre responsabilité de jeter ce matériel ainsi que tout autre matériel électrique ou électronique par les moyens de collecte indiqués par le gouvernement et les pouvoirs publics des collectivités territoriales. L'élimination et le recyclage en bonne et due forme ont pour but de lutter contre l'impact néfaste potentiel de ce type de produits sur l'environnement et la santé publique. Pour plus d'informations sur le mode d'élimination de votre ancien équipement, veuillez prendre contact avec les pouvoirs publics locaux, le service de traitement des déchets, ou l'endroit où vous avez acheté le produit.

Italiano (Italian) - Informazioni relative all'ambiente per i clienti residenti nell'Unione Europea

La direttiva europea 2002/96/EC richiede che le apparecchiature contrassegnate con questo simbolo sul prodotto e/o sull'imballaggio non siano smaltite insieme ai rifiuti urbani non differenziati. Il simbolo indica che questo prodotto non deve essere smaltito insieme ai normali rifiuti domestici. È responsabilità del proprietario smaltire sia questi prodotti sia le altre apparecchiature elettriche ed elettroniche mediante le specifiche strutture di raccolta indicate dal governo o dagli enti pubblici locali. Il corretto smaltimento ed il riciclaggio aiuteranno a prevenire conseguenze potenzialmente negative per l'ambiente e per la salute dell'essere umano. Per ricevere informazioni più dettagliate circa lo smaltimento delle vecchie apparecchiature in Vostro possesso, Vi invitiamo a contattare gli enti pubblici di competenza, il servizio di smaltimento rifiuti o il negozio nel quale avete acquistato il prodotto.

Latviešu valoda (Latvian) - Ekoloģiska informācija klientiem Eiropas Savienības jurisdikcijā

Direktīvā 2002/96/EK ir prasība, ka aprīkojumu, kam pievienota zīme uz paša izstrādājuma vai uz tā iesaiņojuma, nedrīkst izmest nešķirotā veidā kopā ar komunālajiem atkritumiem (tiem, ko rada vietēji iedzīvotāji un uzņēmumi). Šī zīme nozīmē to, ka šī ierīce ir jāizmet atkritumos tā, lai tā nenonāktu kopā ar parastiem mājsaimniecības atkritumiem. Jūsu pienākums ir šo un citas elektriskas un elektroniskas ierīces izmest atkritumos, izmantojot īpašus atkritumu savākšanas veidus un līdzekļus, ko nodrošina valsts un pašvaldību iestādes. Ja izmešana atkritumos un pārstrāde tiek veikta pareizi, tad mazinās iespējamais kaitējums dabai un cilvēku veselībai. Sīkākas ziņas par novecojuša aprīkojuma izmešanu atkritumos jūs varat saņemt vietējā pašvaldībā, atkritumu savākšanas dienestā, kā arī veikalā, kur iegādājāties šo izstrādājumu.

Lietuvškai (Lithuanian) - Aplinkosaugos informacija, skirta Europos Sąjungos vartotojams

Europos direktyva 2002/96/EC numato, kad įrangos, kuri ir kurios pakuotė yra pažymėta šiuo simboliu (įveskite simbolį), negalima šalinti kartu su nerūšiuotomis komunalinėmis atliekomis. Šis simbolis rodo, kad gaminį reikia šalinti atskirai nuo bendro buitinių atliekų srauto. Jūs privalote užtikrinti, kad ši ir kita elektros ar elektroninė įranga būtų šalinama per tam tikras nacionalinės ar vietinės valdžios nustatytas atliekų rinkimo sistemas. Tinkamai šalinant ir perdirbant atliekas, bus išvengta galimos žalos aplinkai ir žmonių sveikatai. Daugiau informacijos apie jūsų senos įrangos šalinimą gali pateikti vietinės valdžios institucijos, atliekų šalinimo tarnybos arba parduotuvės, kuriose įsigijote tą gaminį.

Malti (Maltese) - Informazzjoni Ambjentali għal Klijenti fl-Unjoni Ewropea

Id-Direttiva Ewropea 2002/96/KE titlob li t-tagħmir li jkun fih is-simbolu fuq il-prodott u/jew fuq l-ippakkjar ma jistax jintrema ma' skart muniċipali li ma ġiex isseparat. Is-simbolu jindika li dan il-prodott għandu jintrema separatament minn ma' l-iskart domestiku regolari. Hija responsabbiltà tiegħek li tarmi dan it-tagħmir u kull tagħmir ieħor ta' l-elettriku u elettroniku permezz ta' faċilitajiet ta' ġbir appuntati apposta mill-gvern jew mill-awtoritajiet lokali. Ir-rimi b'mod korrett u r-riċiklaġġ jgħin jipprevjeni konsegwenzi negattivi potenzjali għall-ambjent u għas-saħħa tal-bniedem. Għal aktar informazzjoni dettaljata dwar ir-rimi tat-tagħmir antik tiegħek, jekk jogħġbok ikkuntattja lill-awtoritajiet lokali tiegħek, is-servizzi għar-rimi ta' l-iskart, jew il-ħanut minn fejn xtrajt il-prodott.

Magyar (Hungarian) - Környezetvédelmi információ az európai uniós vásárlók számára

A 2002/96/EC számú európai uniós irányelv megkívánja, hogy azokat a termékeket, amelyeken, és/vagy amelyek csomagolásán az alábbi címke megjelenik, tilos a többi szelektálatlan lakossági hulladékkal együtt kidobni. A címke azt jelöli, hogy az adott termék kidobásakor a szokványos háztartási hulladékelszállítási rendszerektõl elkülönített eljárást kell alkalmazni. Az Ön felelõssége, hogy ezt, és más elektromos és elektronikus berendezéseit a kormányzati vagy a helyi hatóságok által kijelölt gyűjtõredszereken keresztül számolja fel. A megfelelõ hulladékfeldolgozás segít a környezetre és az emberi egészségre potenciálisan ártalmas negatív hatások megelõzésében. Ha elavult berendezéseinek felszámolásához további részletes információra van szüksége, kérjük, lépjen kapcsolatba a helyi hatóságokkal, a hulladékfeldolgozási szolgálattal, vagy azzal üzlettel, ahol a terméket vásárolta.

Nederlands (Dutch) - Milieu-informatie voor klanten in de Europese Unie

De Europese Richtlijn 2002/96/EC schrijft voor dat apparatuur die is voorzien van dit symbool op het product of de verpakking, niet mag worden ingezameld met niet-gescheiden huishoudelijk afval. Dit symbool geeft aan dat het product apart moet worden ingezameld. U bent zelf verantwoordelijk voor de vernietiging van deze en andere elektrische en elektronische apparatuur via de daarvoor door de landelijke of plaatselijke overheid aangewezen inzamelingskanalen. De juiste vernietiging en recycling van deze apparatuur voorkomt mogelijke negatieve gevolgen voor het milieu en de gezondheid. Voor meer informatie over het vernietigen van uw oude apparatuur neemt u contact op met de plaatselijke autoriteiten of afvalverwerkingsdienst, of met de winkel waar u het product hebt aangeschaft.

Norsk (Norwegian) - Miljøinformasjon for kunder i EU

EU-direktiv 2002/96/EF krever at utstyr med følgende symbol avbildet på produktet og/eller pakningen, ikke må kastes sammen med usortert avfall. Symbolet indikerer at dette produktet skal håndteres atskilt fra ordinær avfallsinnsamling for husholdningsavfall. Det er ditt ansvar å kvitte deg med dette produktet og annet elektrisk og elektronisk avfall via egne innsamlingsordninger slik myndighetene eller kommunene bestemmer. Korrekt avfallshåndtering og gjenvinning vil være med på å forhindre mulige negative konsekvenser for miljø og helse. For nærmere informasjon om håndtering av det kasserte utstyret ditt, kan du ta kontakt med kommunen, en innsamlingsstasjon for avfall eller butikken der du kjøpte produktet.

Polski (Polish) - Informacja dla klientów w Unii Europejskiej o przepisach dotyczących ochrony środowiska

Dyrektywa Europejska 2002/96/EC wymaga, aby sprzęt oznaczony symbolem znajdującym się na produkcie i/lub jego opakowaniu nie był wyrzucany razem z innymi niesortowanymi odpadami komunalnymi. Symbol ten wskazuje, że produkt nie powinien być usuwany razem ze zwykłymi odpadami z gospodarstw domowych. Na Państwu spoczywa obowiązek wyrzucania tego i innych urządzeń elektrycznych oraz elektronicznych w punktach odbioru wyznaczonych przez władze krajowe lub lokalne. Pozbywanie się sprzętu we właściwy sposób i jego recykling pomogą zapobiec potencjalnie negatywnym konsekwencjom dla środowiska i zdrowia ludzkiego. W celu uzyskania szczegółowych informacji o usuwaniu starego sprzętu, prosimy zwrócić się do lokalnych władz, służb oczyszczania miasta lub sklepu, w którym produkt został nabyty.

Português (Portuguese) - Informação ambiental para clientes da União Europeia

A Directiva Europeia 2002/96/CE exige que o equipamento que exibe este símbolo no produto e/ou na sua embalagem não seja eliminado junto com os resíduos municipais não separados. O símbolo indica que este produto deve ser eliminado separadamente dos resíduos domésticos regulares. É da sua responsabilidade eliminar este e qualquer outro equipamento eléctrico e electrónico através das instalações de recolha designadas pelas autoridades governamentais ou locais. A eliminação e reciclagem correctas ajudarão a prevenir as consequências negativas para o ambiente e para a saúde humana. Para obter informações mais detalhadas sobre a forma de eliminar o seu equipamento antigo, contacte as autoridades locais, os serviços de eliminação de resíduos ou o estabelecimento comercial onde adquiriu o produto.

Română (Romanian) - Informații de mediu pentru clienții din Uniunea Europeană

Directiva europeană 2002/96/CE impune ca echipamentele care prezintă acest simbol pe produs şi/sau pe ambalajul acestuia să nu fie casate împreună cu gunoiul menajer municipal. Simbolul indică faptul că acest produs trebuie să fie casat separat de gunoiul menajer obişnuit. Este responsabilitatea dvs. să casați acest produs şi alte echipamente electrice şi electronice prin intermediul unităților de colectare special desemnate de guvern sau de autoritățile locale. Casarea şi reciclarea corecte vor ajuta la prevenirea potențialelor consecințe negative asupra sănătății mediului şi a oamenilor. Pentru mai multe informații detaliate cu privire la casarea acestui echipament vechi, contactați autoritățile locale, serviciul de salubrizare sau magazinul de la care ați achiziționat produsul.

Slovenčina (Slovak) - Informácie o ochrane životného prostredia pre zákazníkov v Európskej únii

Podľa európskej smernice 2002/96/ES zariadenie s týmto symbolom na produkte a/alebo jeho balení nesmie byť likvidované spolu s netriedeným komunálnym odpadom. Symbol znamená, že produkt by sa mal likvidovať oddelene od bežného odpadu z domácností. Je vašou povinnosťou likvidovať toto i ostatné elektrické a elektronické zariadenia prostredníctvom špecializovaných zberných zariadení určených vládou alebo miestnymi orgánmi. Správna likvidácia a recyklácia pomôže zabrániť prípadným negatívnym dopadom na životné prostredie a zdravie ľudí. Ak máte záujem o podrobnejšie informácie o likvidácii starého zariadenia, obráťte sa, prosím, na miestne orgány, organizácie zaoberajúce sa likvidáciou odpadov alebo obchod, v ktorom ste si produkt zakúpili.

Slovenčina (Slovene) - Okoljske informacije za stranke v Evropski uniji

Evropska direktiva 2002/96/EC prepoveduje odlaganje opreme, označene s tem simbolom – na izdelku in/ali na embalaži – med običajne, nerazvrščene odpadke. Ta simbol opozarja, da je treba izdelek odvreči ločeno od preostalih gospodinjskih odpadkov. Vaša odgovornost je, da to in preostalo električno in elektronsko opremo odnesete na posebna zbirališča, ki jih določijo državne ustanove ali lokalna uprava. S pravilnim odlaganjem in recikliranjem boste preprečili morebitne škodljive vplive na okolje in zdravje ljudi. Če želite izvedeti več o odlaganju stare opreme, se obrnite na lokalno upravo, odpad ali trgovino, kjer ste izdelek kupili.

Suomi (Finnish) - Ympäristöä koskevia tietoja EU-alueen asiakkaille

EU-direktiivi 2002/96/EY edellyttää, että jos laitteistossa on tämä symboli itse tuotteessa ja/tai sen pakkauksessa, laitteistoa ei saa hävittää lajittelemattoman yhdyskuntajätteen mukana. Symboli merkitsee sitä, että tämä tuote on hävitettävä erillään tavallisesta kotitalousjätteestä. Sinun vastuullasi on hävittää tämä elektroniikkatuote ja muut vastaavat elektroniikkatuotteet viemällä tuote tai tuotteet viranomaisten määräämään keräyspisteeseen. Laitteiston oikea hävittäminen estää mahdolliset kielteiset vaikutukset ympäristöön ja ihmisten terveyteen. Lisätietoja vanhan laitteiston oikeasta hävitystavasta saa paikallisilta viranomaisilta, jätteenhävityspalvelusta tai siitä myymälästä, josta ostit tuotteen.

Svenska (Swedish) - Miljöinformation för kunder i Europeiska unionen

Det europeiska direktivet 2002/96/EC kräver att utrustning med denna symbol på produkten och/eller förpackningen inte får kastas med osorterat kommunalt avfall. Symbolen visar att denna produkt bör kastas efter att den avskiljts från vanligt hushållsavfall. Det faller på ditt ansvar att kasta denna och annan elektrisk och elektronisk utrustning på fastställda insamlingsplatser utsedda av regeringen eller lokala myndigheter. Korrekt kassering och återvinning skyddar mot eventuella negativa konsekvenser för miljön och personhälsa. För mer detaljerad information om kassering av din gamla utrustning kontaktar du dina lokala myndigheter, avfallshanteringen eller butiken där du köpte produkten.

WEB: For additional information, please visit **www.linksys.com/international**

Appendix F: Contact Information

If you experience problems with any Linksys product, you can e-mail us at:

Europe

Location		E-mail Address
	Austria	support.at@linksys.com
	Belgium	support.be@linksys.com
	Czech Republic	support.cz@linksys.com
	Denmark	support.dk@linksys.com
	Finland	support.fi@linksys.com
	France	support.fr@linksys.com
	Germany	support.de@linksys.com
	Greece	support.gr@linksys.com (English only)
	Hungary	support.hu@linksys.com
	Ireland	support.ie@linksys.com
	Italy	support.it@linksys.com
	Netherlands	support.nl@linksys.com
	Norway	support.no@linksys.com
	Poland	support.pl@linksys.com
	Portugal	support.pt@linksys.com
	Russia	support.ru@linksys.com
	Spain	support.es@linksys.com
	Sweden	support.se@linksys.com
	Switzerland	support.ch@linksys.com
	Turkey	support.tk@linksys.com
	United Kingdom	support.uk@linksys.com

Outside of Europe

Location	E-mail Address
Asia Pacific	asiasupport@linksys.com (English only)
Latin America	support.portuguese@linksys.com or support.spanish@linksys.com
Middle East & Africa	support.mea@linksys.com (English only)
South Africa	support.ze@linksys.com (English only)
UAE	support.ae@linksys.com (English only)
U.S. and Canada	support@linksys.com

NOTE: For some countries, support may be available only in English.